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THE ORIGIN OF INTRAOCULAR PRESSURE

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BERLIN

Based upon his measurements of the pressure in the vortical veins, the author confirms Dieter's statement: intraocular pressure equals hydrostatic pressure minus colloid-osmotic pressure. He found that the blood enters the eye under the least possible pressure and leaves it where that pressure is greatest. An understanding of the developmental history alone makes this statement and its implications clear. Read before the Berliner ophthalmologische Gesellschaft, April 28, 1932.

To future ophthalmologists it will seem an unintelligible proceeding that we have devoted ourselves for so many decades to attempting to explain the pathologically increased intraocular pressure without going into the question as to how normal intraocular pressure originates. It is just as if the internist were to solve the problem of the increased blood pressure without knowing how normal pressure is brought about. In 1903, it is true, Leber observed (Handbuch of Graefe-Saemisch, ed. 2) in his contribution on the fluid and nutritive conditions in the eye, that the intraocular pressure was caused by the blood pressure, but he makes no attempt to define this process in greater detail. It had, however, been recognized since the 50's that increased intraocular pressure was the chief symptom of glaucoma and the most varied theories had been constructed to account for its occurrence.

To Seidel[1] belongs the great credit of having first approached the question of the origin of the normal ocular pressure in a systematic manner. He specially recognized that the osmotic pressure, discovered by Starling[2] about twenty years previously, must also be taken into account when considering the origin of intraocular pressure.

For the explanation of the term "osmotic pressure", it may be remarked that this arises when there is a watery solution of crystalloid and colloid substances on one side of a semipermeable membrane, and on the other side only water or a weaker solution. A semipermeable membrane has the property of allowing only water, not the dissolved substances, to percolate through. The pressure caused by the suppression of the compensating tendency existant between the two liquids, is not small. It is the greater the higher the concentration of crystalloid and colloid substances on the one side of the membrane and the lower it is on the other.

Blood is such a watery solution of crystalloid and colloid substances and the capillary wall has the property of a semipermeable membrane. Inasmuch as the crystalloid substances in the blood and aqueous humor are the same, the blood does not exercise a crystalloid-osmotic pressure. This, however, is certainly not true with respect to the colloid-osmotic pressure, for the blood contains about seven to eight percent of albumen, whereas the aqueous humor is almost completely free from it. As with every percent of difference in the albumen content the colloid-osmotic pressure increases by 3 to 4 mm. Hg, there arises a pressure of 26 to 30 mm. Hg between the blood and the aqueous humor.

Osmotic pressure does not have the effect of exercising pressure on the surrounding liquid, but on the contrary, that of suction, a negative pressure, so to speak. It follows that if the blood pressure in the ocular blood vessels amounted to only 26 to 30 mm. Hg, this would be just compensated by the colloid-osmotic pressure of the blood, but an ocular pressure could not be pro-

duced beyond that. In other words we should have a completely soft eye.

If, as one assumes, the blood pressure really produces the intraocular pressure, then the former should have a height exceeding the colloid-osmotic pressure by the value of the ordinary intraocular pressure; that is, by 20 to 25 mm. Hg. The result is the statement: Intraocular pressure equals the hydrostatic pressure minus the colloid-osmotic pressure. The exact formulation of this sentence was first brought out by Dieter[3] some years later.

In spite of this recognition, no progress was made in clearing up the question of the origin of ocular pressure because, as I was later to discover, the fundamental error was made of applying the blood pressure found in the veins of the retina to the veins of the uvea also. Inasmuch, however, as there is no doubt that the pressure in the retinal veins is only a little above the intraocular pressure—they commence to pulsate at a slight pressure of the fingers upon the eyeball—this, as we have just seen, is counteracted by the equally high colloid-osmotic pressure; thus the theory, in itself correctly thought out, continually failed in practice.

Whereas Seidel, in consequence, assumed that intraocular pressure originated in a different way, by a still unknown vital power generated by the secretion of the aqueous humor through the ciliary processes, others, particularly Dieter, Duke-Elder[4] and Baurmann[5], attempted to find the pressure requisite for the above theory (about 50 mm. Hg) in the capillaries of the retina. In so doing they started from an erroneous premise, and their attempts must therefore be regarded as unsuccessful.

The simplest method of obtaining information regarding pressure conditions in the veins of the uvea, upon which intraocular pressure in the first place, depends, undoubtedly was to measure the pressure in them directly. Seidel made these measurements on the vortical vein of the rabbit, at a place outside the sclera. There he found comparatively low values—10 to 15 mm. Hg —which did not produce any new viewpoints for the origin of ocular pressure. The Koenigsberg physiologist, Weiss[6], also carried out a few pressure tests on the vortical veins, but farther along on their way inside the sclera. He found considerably higher values, but these were of such wide range (33 to 63 mm. Hg) that they were useless in clearing up the difficulty.

These tests were resumed by me[7] on a large amount of material, and I found that *a considerably higher pressure is uniformly present in the vortical veins than in the veins of the retina; namely, 50 to 55 mm. Hg on the average.* By this the situation was cleared at one stroke and a sure basis found for the statement: intraocular pressure equals hydrostatic pressure minus colloid-osmotic pressure.

At first it would, perhaps, appear strange that it should be possible that so great a difference in pressure should be present continually in the blood vessels of two part organs within one organ, which are in such close contact. We must, however, remember that this fact of the separation of the system of blood vessels in the retina from those in the uvea has long been known. This separation is characteristically far more complete in the veins, upon which intraocular pressure here solely depends, than in the arteries, which have small connections with each other in the vicinity of the papilla.

Far more difficult than to discover experimentally the fact of the high pressure in the vortical veins was it to answer the question, how this high pressure originates. It soon became clear to me that the answer to this question could be given only by the *history of development.* Extensive investigations of the developmental history, aiming at the elucidation of the construction of the whole eye, have, as a matter of fact, given the answer. I should like to report briefly on the result.

According to Fuchs[8] the primary vesicle of the eye is bound about by a loose network of capillaries, which I should like to designate the primary capillaries. It is supplied mainly by the A. hyaloidea. At the end of the first and the beginning of the second month the ocular vesicle is transformed by the de-

velopment of the lens and of the ocular fissure into the secondary optic cup. At the same time the arteria hyaloidea enters into the interior of the eye and thus is given a new task; namely, the arterial provision for the interior organs of the eye, vitreous body, posterior half of the lens, and later, also, of the retina. The primary capillaries of the posterior half of the eyeball are now provided for by smaller lateral branches of the arteria ophthalmica, the later arteriae ciliares posticae breves, and form the first rudiment of the choroid. The primary capillaries of the anterior half of the eyeball, on the other hand, are subjected, in the course of the second and the beginning of the third month, to a gradual obliteration. Here is formed, especially in conjunction with the pupillary membrane, which is in process of development at this time, a new system of blood vessels, which receives its arterial supply through the two arteriae ciliares posticae longae. Thus, at this time, the arterial provision of the uvea is regulated practically in the same manner as in the fully developed eye.

The venous derivation, of course, is more important for the further development of the eye. Until now it has not been given the attention it deserves, and one was content to assume that the entire venous blood of the uvea and that from the vascular regions of the A. hyaloidea was carried off from the very beginning by the vortical veins. The facts, however, are substantially different and more complicated. In my investigation into the developmental history, I discovered that *the venae vorticosae become important as the principal outflow channels from the uvea only in the course of the fourth month* and that the *drainage from the region of the A. hyaloidea is completely separate from that of the A. ciliares posticae longae.* Furthermore, I was able to ascertain that *an extremely important mechanical developmental fact, previously unobserved, consists in that the sclera owing to its increasing condensation, exercises a pressure on the veins passing through it that hinders the outflow of the blood to an increasing extent, the more so as the vessels pass through it very obliquely and the pressure in the veins is minimal.*

It is important to make the process that takes place here very clear, for it is of the greatest significance to the development of the whole eye. We have before us a growing eye, hence the drainage vessels, especially as their number remains unchanged, must increase in extent. On the other hand, the sclera becomes denser and firmer. Consequent upon these procedures, which have opposite tendencies, the result must be that a space-constricting pressure on the veins arises which hinders the flow of their contained blood. I shall deal with the influence of this pressure upon the arteries later.

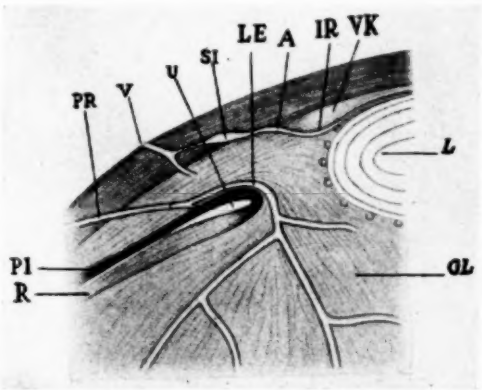

Fig. 1 (Sondermann). Diagrammatic drawing of the venous system in the anterior half of the eyeball in a human foetus at the beginning of the third month. GL. = vitreous body; L. = lens; VK. = anterior chamber; Ir. = v. irido-scleralis; A. = point where the v. irido-scleralis crosses over into the border fibers of the sclera; LE. = v. lento-ciliaris; SI. = sinus irido-scleralis (later Schlemm's canal); U. = margin of the secondary optic cup; V. = v. ciliaris anterior; PR. = v. ciliaris primitiva; PI. = pigment layer of the optic cup; R. = retinal layer of the optic cup.

Figure 1 reproduces a diagrammatic drawing of the venous conditions in the anterior half of the eyeball at the beginning of the third month. First of all one clearly recognizes here the separation of the outflow regions of the A. hyaloidea on the one hand, and those of the A. ciliares longae, whose chief region of supply at present is the pupillary membrane, on the other. The veins proceed-

ing from the latter, as is shown in the figure, soon pass into the sclera and unite in it with the vv. ciliares anteriores coming out of the ciliary body. The vessels designated by me as the vv. iridosclerales enter into the sclera near the limbus, that is, just where the thicken-

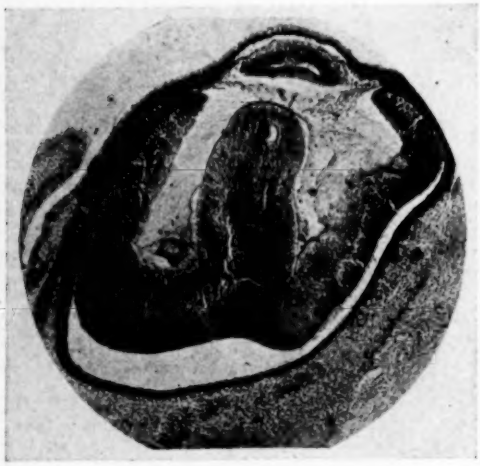

Fig. 2 (Sondermann). Lateral section through the eye of a human embryo at the end of the second month.

ing of the sclera begins, as we know and as can be seen in later figures. The consequences, accordingly, are (1) an increase of pressure in the vein, (2) its extension into the distally situated stretches, especially a circumscribed great widening in the form of a sinus formation just before it enters the real sclera—it runs for a distance far into the border fibers of the sclera—and, very probably, (3) filtration.

The last-named point requires a more detailed explanation as to how far the prerequisites for filtration are present, which, as is known, occurs only where there are differences in pressure. Since definite data as to the pressure conditions inside and outside the vessels are lacking, it can be only a matter of calculating probabilities.

The first prerequisite for filtration is the presence of a corresponding hydrostatic pressure in the capillaries. As this pressure, apart from the hindrance to outflow, is dependent upon the pressure in the arteries, the first thing to be done is to obtain clarity, if possible, on this subject. The heart action starts at the beginning of the third week. It can, therefore, be assumed that it has gained considerably in power by the end of the second month. The heart muscle, which at this time is already relatively powerful, would so indicate. The relative growth of the heart is greater in the first three months than in those following. At the end of the first month it forms about one tenth of the whole body (Fischel: Lehrbuch d. Entwicklungsgeschichte des Menschen, 1929, p. 699). At the same time intraocular pressure is nil, for with the incomplete development of the eyeball the prerequisites for its origin are not yet present. Colloid-osmotic pressure, which is based upon the difference in the content of albumen in the blood and lymph, is also relatively slight, for the latter, as is generally assumed, contains not less but more albumen in the foetus than later on. Accordingly, the prerequisites for filtration may well be considered present. It may be supposed that this predomination of the hydrostatic pressure over the ocular pressure, plus colloid-osmotic pressure obtains throughout the whole period of development, so that, owing to filtration, even though minimal, the quantity of aqueous humor increases during the period of scleral condensation. Only after the termination of growth, that is, after a definite, permanent state has been reached, does this prerequisite to continuous filtration cease. Then a state of equilibrium begins, in which the exchange of liquid takes place under entirely different conditions (cf. my paper "Ueber Entstehung, Physiologie und Pathologie des Augendrucks", Arch. f. Augenh., 1929, v. 102). The filtrate collects as aqueous humor between the endothelium of the cornea, already existing at this time, and the pupillary membrane.

The above-mentioned formation of a sinus is nothing extraordinary because of the hindrances to outflow. We find such circumscribed widenings in other veins also; thus, in the vena vorticosa before its entrance into the sclera, as sinus vorticosus, and in the vena jugularis interna before its entrance into the cranial capsule as bulbus v. jugularis.

Gradually the vv. irido-sclerales are entirely obliterated, except the sinus portion and the venous blood of the pupillary membrane is drained by a lateral vessel into the uveal net of veins. How the angle of the chamber and Schlemm's canal are further formed from this obliterating process of about sixty to seventy venae irido-sclerales, I cannot go into here. The attention of those interested in the details is called to my papers, cited above, on the developmental history.

A few illustrations will serve to exemplify what has just been said. Figure 2, a lateral section through the eye of a foetus of the second month, depicts how firmly the part of the sclera adjoining the cornea has at this time already condensed, whereas posteriorly it does not yet appear as an independent ocular membrane. Figure 3, taken from a foetus at the beginning to middle of the fifth month, shows the lateral vessel that carries away the blood of the vena

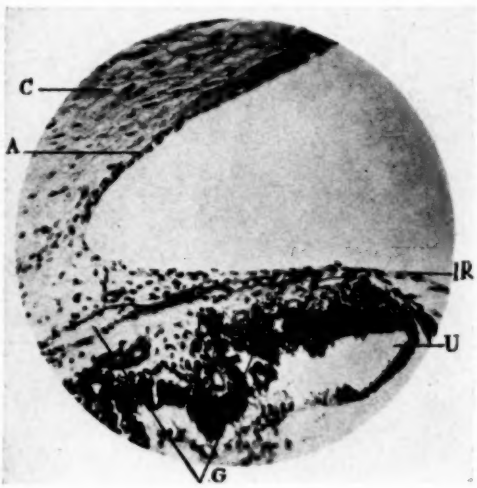

Fig. 3 (Sondermann). From a foetus at the beginning of the fifth month. C. = cornea; IR. = v. irido-scleralis; U. = annular sinus; G. = vessel branching from the v. irido-scleralis.

irido-scleralis, which at that time has become obliterated, back into the uveal vascular region. In figure 4, from a newborn infant, the obliterated portion of the vena irido-scleralis, leading from the sinus to its entrance into the vena ciliaris anterior, can still be recognized. There are also indications of the further course of the vessel medialwards along the outer edge of the trabeculum uveosclerale.

As was remarked above, the veins coming from the interior of the eye, the

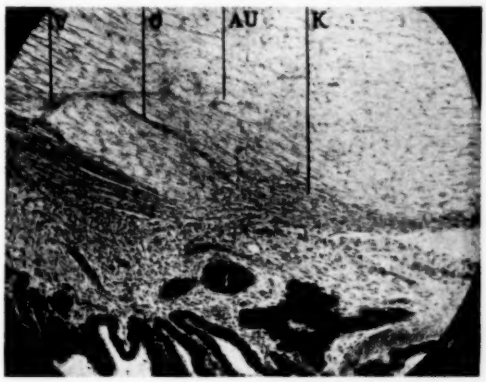

Fig. 4 (Sondermann). From a foetus at the end of pregnancy. V. = v. ciliaris ant.; O. = obliterated v. irido-scleralis with red corpuscles; AU. = outer small channel of Schlemm's canal; K. = Schlemm's canal.

region of the A. hyaloidea, run separately from these veins. The former I have designated venae lento-ciliares, as their greatest number belongs to the vicinity of the lens; that is, to the tunica vasculosa lentis. As can be seen from figure 1, these veins bend over the edge of the secondary optic cup, pass posteriorly over the pigment epithelium, and soon unite into about four large veins, which cross the sclera obliquely and emerge in the vicinity of the equator (fig. 13). Inasmuch as the venae vorticosae are formed only in the vicinity of the equator and thence cross the sclera obliquely, so that they make their appearance only outside, somewhat in the center between equator and opticus, it is impossible that the former veins should be identical with the venae vorticosae. We are dealing, rather, with the hitherto unknown venous channels, which I have termed the venae ciliares primitivae. As may be seen, they run in a part of the sclera that also condenses relatively early, and are therefore subjected to obliteration as early as the fourth month. The venae irido-sclerales

having already been obliterated, from now on all of the venous blood of the uvea, apart from the small venae ciliares anteriores, is carried off through the venae vorticosae.

In considering the consequences connected with the gradually increasing pressure-effect of the sclera upon the venae ciliares primitivae, the interesting

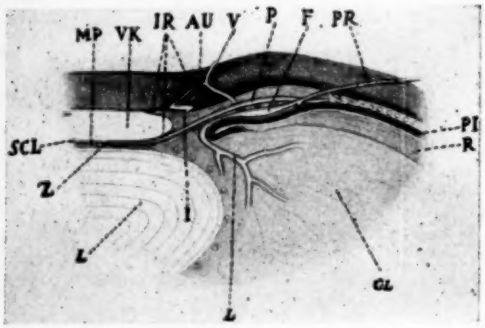

Fig. 5 (Sondermann). Diagrammatic drawing of the venous system in the anterior half of the eyeball of a human foetus at the end of the second month. GL. = vitreous body; L. = v. lento-ciliaris; I. = inner small channel of Schlemm's canal; L. = lens; Z. = branching point of the v. pupillo-ciliaris; SCL. = v. irido-scleralis; MP. = membr. pupillaris; VK. = anterior chamber; IR. = obliterated v. irido-scleralis; AU. = outer small channel of Schlemm's canal; V. = v. ciliaris anterior; P. = v. pupillo-ciliaris; F. = commencing widening of the v. lento-ciliaris, at the same time the beginning of the formation of a ciliary process; PR. = v. ciliaris primitiva; PI. = pigment layer of the optic cup; R. = retinal layer of the optic cup.

fact develops that they are the same as those we have just become acquainted with in the venae irido-sclerales. The pressure in the venae lento-sclerales increases, they widen as a whole, and also form a circumscribed enlargement before their entrance into the sclera. Furthermore, we may assume that filtration occurs for the same reasons that apply in the case of the venae irido-sclerales, by which fluid contributing to the development of the vitreous body is formed.

The circumscribed greater widening is, according to my results, to be considered the first rudiment of the ciliary process. Despite the fact that this transformation does not directly concern the origin of intraocular pressure, I should like to treat it somewhat fully here. Figure 5, which reproduces a diagrammatic drawing of the venous conditions in the anterior half of the eyeball at the end of the third month, shows the beginning of this widening of the vein with the corresponding slight arching of the two epithelial layers. The number of these veins is of great importance. I found that they comprise about sixty to seventy, as in the case of the venae irido-sclerales, and thus correspond to the number of ciliary processes. This fact, in conjunction with the circumscribed widening, suggests the idea of a causal connection.

Figure 6, of a foetus of the third month, shows an injected vena lento-ciliaris, as, coming out of the vitreous body it bends around the edge of the optic cup. Figure 7 is a picture taken from a publication by Versari[10] on the formation of the blood vessels in the eye. The large number of venae lento-ciliares are seen, coming forwards from the vitreous body, and here also a small

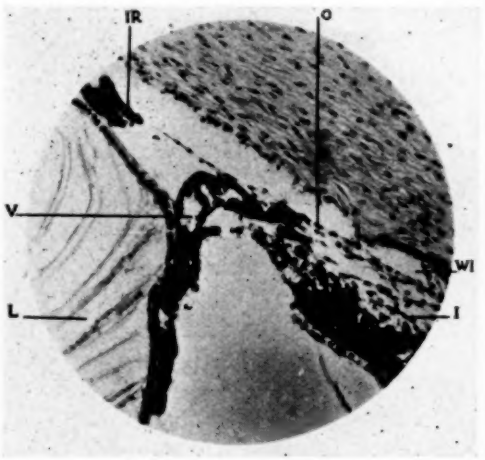

Fig. 6 (Sondermann). From a foetus at the beginning of the fifth month. V. = v. lento-ciliaris; IR. = v. irido-scleralis; O. = obliterated v. irido-scleralis; WI. = angle of the chamber; L. = lens; I. = iris. (The vessels are injected.)

swelling exists at the point of flexure. This latter I mention—it is indicated also in figures 1, 5, and 6—because of its connection with the accepted concept of the existence of a so-called annular vessel that is situated at this place.

From the aforementioned paper by Versari, which was published in 1923, not easily accessible, and which therefore came to my notice only after the conclusion of my investigation, I realized that this author arrived at the same result with regard to the number of the venae lento-ciliares as I, in that he ascertained that such a vein was present for every ciliary process. It is true that the widening of the vessels at this point was missed by him. For this reason he did not think of a causal connection with the origin of the ciliary processes.

Figure 8 reproduces a diagrammatic drawing of the course of the venae lento-ciliares on the pigment epithelium laterally. The arrangement of the veins —sixty-four are shown in the drawing —at once recalls the picture of the ciliary processes. The fibers running between them indicates the obliterated primary capillaries. Section 1 on both sides crosses a vein in its longitudinal course; section 2 crosses the veins obliquely; and section 3 crosses a number

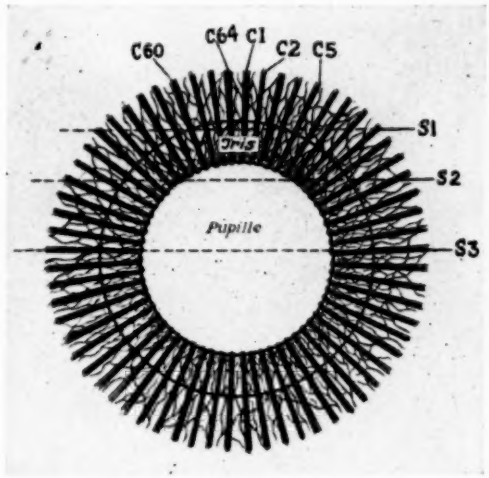

Fig. 8 (Sondermann). Diagrammatic drawing of the course of the venae lento-sclerales. C1, C2 . . . C64 = venae lento-ciliares. S1, S2, S3 = horizontal sections through various planes.

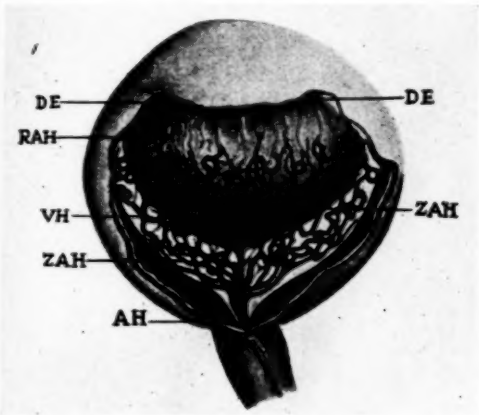

Fig. 7 (Versari). The eye of a human embryo 40 mm. long. Preparation injected. AH. = arteria hyaloidea; VH. = vasa hyaloidea; ZAH. = central branching of the arteria hyaloidea; RAH = venous outflow passages of the arteria hyaloidea or tunica vascula lentis, the so-called membrana capsula pupillaris; DE. = distal ends of these outflow passages.

of them transversely. This picture should serve to provide a better understanding of the illustrations following.

Figure 9, from a foetus of the fourth month, shows an almost meridionally laid section (fig. 8), which, as can be seen in the above diagram, has met a vein longitudinally. At the site of the future ciliary process a considerable widening of the vessel is seen. Figure 10, a foetus of the mid-third month,

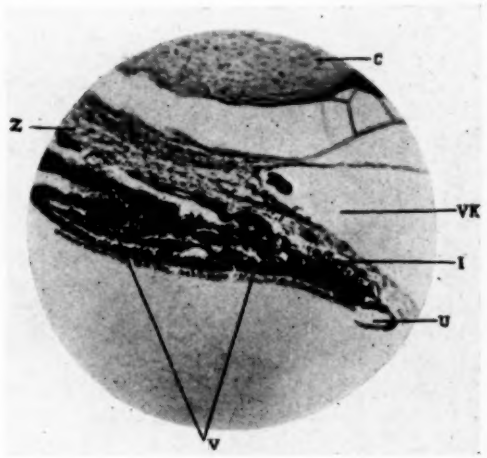

Fig. 9 (Sondermann). From a foetus at the end of the fourth month. V. = v. lento ciliaris; VK. = anterior chamber; U. = annular sinus; C. = cornea (partly separated); Z. = ciliary body; I. = iris.

corresponds to section 2 in figure 8, in which the venae lento-ciliares are met

obliquely. Figure 11 reproduces a peripheral section (sec. 3 of fig. 8), in which a number of veins are met transversely. These pictures of the veins evidently indicate that here there is no

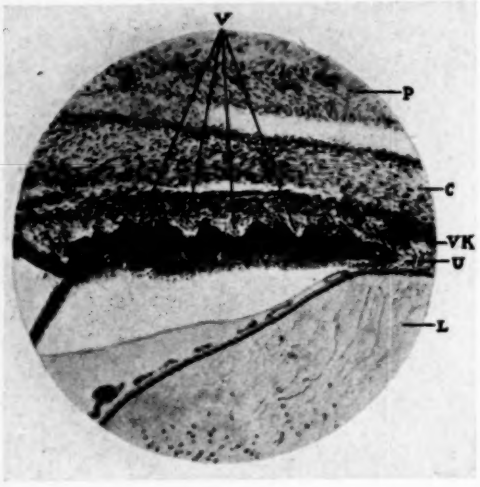

Fig. 10 (Sondermann). From a foetus of the mid-third month. V. = venae lentociliares (injected); P. = lid; C. = cornea; VK. = anterior-chamber angle; U. = margin of the secondary optic cup; L. = lens.

question of vessels that have grown into a pigment-epithelium fold secondarily, as was heretofore assumed, but that the vessels pushed out the epithelium in front of them. This impression is still more directly received in the next section (fig. 12), in which only a single vein is met transversely.

Figure 13, from a foetus of the third month, shows the course of a vena ciliaris primitiva obliquely across the sclera toward the back. The beginning of the anterior part of the uvea clearly shows that in this case there is no question of a vena vorticosa.

There still remains to discuss why the vena vorticosa is not obliterated by the pressure of the sclera, which is growing firmer and firmer. The reason lies in the following: The venae lentociliares and the venae irido-sclerales become completely obliterated because the blood can escape through anastomoses to vessels situated farther back, the venae vorticosae. This is not possible, however, for the blood flowing through the venae vorticosae, behind which no more veins lead through the sclera to the exterior. In this fact, therefore, lies the reason why the blood pressure in the venae vorticosae rises in consequence of the increased arterial pressure that takes place with the growth of the eye until it finally attains the height of 50 to 55 mm. Hg at the termination of development.

In conclusion, the objection might be raised, whether the arterial inflow does not suffer the same restrictive pressure from the sclera. It is the more pointed inasmuch as in the body the arteries and the veins usually course together and are thus subjected to the same condi-

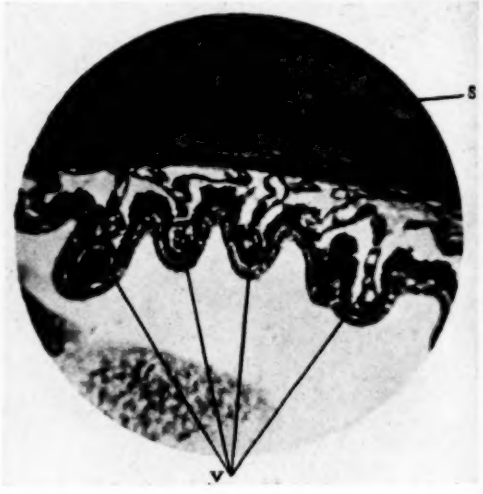

Fig. 11 (Sondermann). Lateral section through the eye of a human embryo at the end of the fourth month. Ciliary process in the process of formation. V. = venae lentociliares; S. = sclera.

tions. It is significant that in the eye conditions are entirely different. The A. hyaloidea, as is known, enters the eye through the optic nerve, and only in the sixth month does the lamina cribrosa begin to form, which, like the sclera, might exert pressure, but can do so to only a slight degree, even in the developed stage, because of its looser construction and the perpendicular course of the central artery through it. The two other main arteries concerned, namely, the arteriae ciliares posticae longae, are subjected to the obstructive

pressure of the sclera relatively late, for they enter the eye near the posterior pole; that is, at a place where the condensation of the sclera is developed latest. On the other hand, our investigations proved that the veins leave the interior of the eye at quite different points and indeed at just those places at which the condensation of the sclera takes place earliest. The important fact is thus proved in quite a clear manner that, on the one hand, *the arterial blood enters the eye under the least possible obstructive pressure, while the venous blood, on the other hand, leaves the eye where that pressure is greatest.*

Thus the veil of mystery which heretofore has lain over the origin of intraocular pressure, is lifted, and it has become possible for us to recognize the wonderful way in which nature, with the aid of the blood pressure, produces

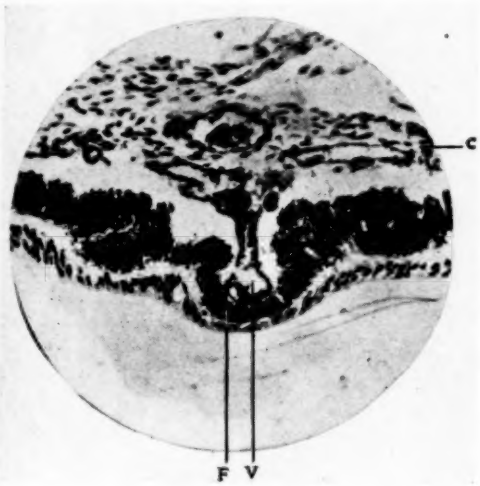

Fig. 12 (Sondermann). Foetus as in figure 9. F. = ciliary process; V. = vena lentociliaris; C. = ciliary body.

Fig. 13 (Sondermann). From a foetus at the beginning of the third month. V. = vena ciliaris primitiva; S. = sclera; C. = choroid.

the uniform intraocular pressure that is maintained throughout life. It has been shown once more how important is the developmental history to research into the morphological structure and the physiological processes in the organs of the body. At the same time, it may become a sign-post in the yet dark regions of research into the pathological ocular pressure.

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References

[1] Seidel. Handbuch der biologischen Arbeitsmethoden, v. 7, sect. 5, pt. 16.
[2] Starling. Jour. Physiol., 1895, v. 19, p. 312; 1899, v. 24, p. 317.
[3] Dieter. Arch. f. Augenh., 1925, v. 96.
[4] Duke-Elder. Brit. Jour. Ophth., 1926, v. 10, p. 533; Recent advances in ophthalmology, 1929.
[5] Baurmann. Arch. f. Ophth., 1924, v. 115, p. 300.
[6] Weiss. Pflueger's Arch., v. 202.
[7] Sondermann. Arch. f. Augenh., 1929, v. 102; Arch. f. Ophth., 1931, v. 126, p. 131.
[8] Fuchs. Anat. Hefte, 1905, v. 28.
[9] Sondermann. Arch. f. Ophth., 1930, v. 124, p. 521; 1930, v. 125, p. 407; 1931, v. 126, p. 341; 1931, v. 127, p. 347; 1932, v. 128, p. 119. Zeitschr. f. Anat. u Entw., 1929, v. 88.
[10] Versari. Ric. Morf., 1923, v. 3.

PANTOCAIN AS A LOCAL ANESTHETIC IN OPHTHALMOLOGY

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AND
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The action of this derivative of novocain was tested on ten normal eyes and subsequently used as a local anesthetic in a number of ophthalmological procedures, with good results. Its relative toxicity for human beings is less than that of cocain, and no idiosyncrasies have as yet been observed. The technic employed in its use is described fully.
From the Wilmer Ophthalmological Institute of the Johns Hopkins University and Hospital. Read before the American Ophthalmological Society, New London, June 27, 1932.

Of local anesthetics there are many. One of the newest is pantocain, a derivative of novocain. Pantocain, or butylamino-benzoic-acid-B-dimethylamino ethylestermono-hydrochloride, is a white crystalline substance. It is odorless, quite stable when exposed to light and air, readily soluble in water, and withstands prolonged boiling without decomposition. Its melting point is 146°-147° C. (Schmidt[1], Wiedhopf[2]).

In a 1 percent normal salt solution, it has a pH of about 6.7 (Wiedhopf). In a .1 percent normal salt solution, it has a pH of 7 (Wiedhopf, Schmidt). Pantocain combines well with adrenalin chloride and may be used safely in conjunction with many other drugs. Reible[3] reports on its compatibility with homatropin, atropin, scopolamin, boric acid, eserin, pilocarpin, resorcin, zinc sulphate. This agrees with our own experience.

Lundy and Essex[4], Fussgänger and Schaumann[5], Ernst[6], and Schmidt[1] are in close agreement in regard to the toxicity of this substance. According to these observers, the subcutaneous absolute toxicity of pantocain is ten times that of novocain; but the effective dose of pantocain is only one tenth that of novocain. The relative toxicity is therefore 1:1. According to Schmidt, the relative toxicity of the 1 percent pantocain compared with the 10 percent novocain, is 1:1 by subcutaneous injection; but 1:1.6 by intravenous administration. The toxicity of a 1 percent solution of pantocain is equal to that of 2 percent cocain. But because it is effective as a surface anesthetic (corneal) in 1:10,000, whereas cocain is first effective in 1:1000, the relative toxicity of pantocain is therefore less than that of cocain (Fussgänger and Schaumann[5], Schmidt[1]).

Pantocain has been used instead of 10 percent cocain, in many foreign laryngological clinics. Hirsch[7] sums up his results as follows: (1) it is less toxic; (2) it has no effect on the tissue, and does not cause dilation of the vessels at the site of injection; (3) it dissolves readily in water and withstands sterilization well; (4) it combines well with adrenalin chloride; (5) it infiltrates the tissues readily.

In 1929, Schmidt reported the use of pantocain for infiltration and spinal anesthesia. In this country, Lundy and Essex[4] have used it intraspinously in 400 cases; but German investigators have studied its effect more extensively. Singer[8] reports 1,300 cases in which a 2 percent solution of pantocain was used in various types of operations on the nose, throat, and sinuses. Tobeck[9] and Theissing[10] used a 1 percent solution of pantocain for a number of operations on the upper respiratory tract. The solution was always used in combination with adrenalin chloride. No toxic results were observed.

Kies[11] used pantocain for conduction and infiltration anesthesia in over 500 cases. In no instance was there any toxic manifestation. The operative procedures included hernioplastic, abdominal, urological, and gynecological operations. He also reported the use of 2 percent pantocain (two or three drops of adrenalin chloride to 20 c.c. of pantocain) in operations for hemorrhoids and for cystoscopic examinations. His experience with spinal anesthesia was limited to seven cases. The results, however, were very satisfactory.

Runge and Schmidt[12] used pantocain

in fifty-five cases for infiltration anesthesia, and in 167 cases intraspinously. The results were good. Schmidt stated it had been used in over 8000 cases in the Urological and Laryngological Clinics of the University of Hamburg-Eppendorf with good results.

Pfitzner[13] used .5 percent pantocain for conduction and infiltration anesthesia in 185 cases. There was no tissue disturbance. The anesthesia produced was better than that obtained with novocain. The types of operative procedures included hernioplasty, removal of small tumors, vasectomy, phrenicectomy, thoracotomy, and various abdominal operations. Gastrostomy, appendectomy, and laporotomy were performed under the local anesthesia of pantocain with a few ounces of supplemental ether. For infiltration anesthesia, he used five drops of adrenalin to every 100 c.c. of 1 percent pantocain. He also reported eighty-five cases which received pantocain intraspinously. These cases included general surgical and gynecological operations.

Schülein[14] recommends the use of pantocain as a substitute for novocain because of its prolonged action and cheapness. He does not mention the types of cases, but gives an example of a patient whose fingernail had to be removed. The duration of anesthesia with pantocain was from 4 to 6 hours; with novocain from 1-1/2 to 1-3/4 hours.

Payr[15] reports the favorable results obtained from the local injection of pantocain into the omental bursa as a method of anesthesia for operations on the upper abdomen.

Very little mention has been made of the advantages of pantocain in ophthalmology. Only two references could be found in the German literature (Glees[16], Reible[3]) and none in the English.

Preparation: Pantocain comes in tablets (0.1 gm.), in powder, and in solution in hermetically sealed ampules. The distributor in this country is the Winthrop Chemical Company in New York.

The required amount of pantocain is dissolved in physiologic sodium chloride solution, and sterilized by boiling for a short period of time. After the solution has cooled, adrenalin chloride may be added if desired. It is important to prepare the solution in normal salt solution; for pantocain has a powerful hypotonic action in an aqueous solution; but prepared in physiological saline, it is free from traumatic disturbances and hemolysis (Fussgänger and Schaumann[5], Schmidt[1]).

Sterilization of pantocain is conducted by placing the solution in the autoclave for 15 minutes, at 15 pounds pressure. Bacteriological investigations of these solutions show that after six days' use, no pathogenic organisms have been found, although the pipette has been frequently removed and replaced during that period.

Pantocain has been used in the Wilmer Ophthalmological Institute in more than 500 cases with gratifying results. It has shown certain definite advantages over other forms of local anesthesia.

Ten Normal Eyes. In each case, two drops of a 1/2 percent solution of pantocain were instilled in the lower cul-de-sac. When the eyelids were kept closed, there was practically no smarting from the drug; but when the eyelids were opened every few seconds to test the smarting, the longest duration of stinging was 47 seconds, the shortest 25 seconds, the average 34.3 seconds. The second instillation was made by dropping the solution on the cornea. Anesthesia was complete immediately after the second application, and lasted from 9 to 30 minutes, with an average of 20 minutes. Slight lacrimation occurred in all cases upon opening the eyes; but there was no hyperemia. In no instance was there any disturbance of the corneal epithelium.

The personal experience of one observer (Wilmer) indicates the usefulness of this drug. A cinder under the upper eyelid and a fragment on the cornea, rendered the eye very uncomfortable. After the instillation of two drops of a 1/2 percent solution of pantocain, there was no stinging sensation while the eyelids remained closed; but there was a slight smarting when the eyes were opened. This

disappeared at the end of 24 seconds. After a second instillation of pantocain, the foreign bodies were quickly removed without any discomfort. The application of pantocain was not followed by any later smarting, lacrimation, hyperemia, or blurring of vision; and there was no interference in the use of the eyes for the ophthalmoscope or the slitlamp. Anesthesia disappeared at the end of 23 minutes.

In addition to the normal eyes mentioned above, pantocain has been used for many ophthalmological procedures where a local anesthetic was necessary —tonometry; application of contact glasses; subconjunctival injections of salt solutions; dilation of the tear duct; treatment of conjunctival inflammations; removal of foreign bodies; diathermy; use of the thermaphore; transillumination; for obtaining epithelial scrapings; and for ophthalmoscopy and biomicroscopy, where the eyes were inflamed and sensitive.

Pantocain has also been used in the following operative procedures: extraction of cataract; discission of capsular cataract; sclerocorneal trephining; posterior sclerotomy; iridectomy; removal of chalazia; ignipuncture; tenotomy; recession and advancement of the extraocular muscles; and tatooing of the cornea.

In the case of minor procedures, such as the use of the tonometer, two drops of a 1/2 percent solution of pantocain are instilled in the lower lid while the patient looks up. The eyes are then closed; but every few seconds they are opened to note the disappearance of the stinging. As soon as this occurs, two more drops of the same solution are dropped on the cornea while the patient looks down. As a rule, within 2 minutes after the first application, anesthesia is complete. In major operations, two drops of a 1/2 percent solution of pantocain are put in the eye 5 minutes before the patient is brought to the operating suite. The remaining instillations are made in quick succession just preceding the operation. For cataract extraction, usually four applications are made; for sclerocorneal trephining, four; for operations on the muscles, six. As in the case of the other local anesthetics previously used, in very nervous subjects it is the custom to give the injection of morphine, 16 mgm., and scopolamin, 0.3 mgm., half an hour before the operation. In sclerocorneal trephining, in addition to the use of pantocain, the injection of novocain and adrenalin chloride is made at the site of the conjunctival flap. It is the intention later to substitute a smaller dose of a .1 percent solution of pantocain with adrenalin for the novocain.* Complete anesthesia was produced in all cases. No corneal disturbances have been noted except the usual tendency to drying of the cornea from prolonged exposure in muscle operations. This is less than in the case of other local anesthetics. No postoperative complications have been observed.

At our suggestion, the Dental Department of the Johns Hopkins Hospital has been using pantocain as a conduction anesthetic for dental extractions with such favorable results that the dental surgeons are inclined to believe that .1 percent solution is of sufficient strength to produce a satisfactory anesthesia.

Disadvantages: The toxicity of this drug for human beings is not definitely known; so far it has been determined only through animal experimentation. Idiosyncrasies have not yet been observed, and our experience is not sufficiently large to permit a report upon this phase. No definite antiseptic property of this drug has yet been demonstrated.

Advantages: Quickness of action; depth of penetration; freedom from smarting and irritation; well tolerated; very little tendency to drying of cornea; does not dilate pupil; does not increase intraocular tension; acts well in one-half-percent solution; combines readily with adrenalin and other drugs; is inexpensive.

Conclusions

The advantages already enumerated will secure for pantocain a permanent place in the examining and the operat-

* Since writing the above, this substitution has been made with satisfactory results.

ing rooms; and in spite of the many local anesthetics now in use, pantocain is a very valuable addition to the armamentarium of the ophthalmologist.

References

[1] Schmidt, H. Ein neues Lokalanaestheticum der Novacainreihe (Pantocain). Chirurg., 1931, Feb., v. 3, pp. 97-105.

[2] Wiedhopf, O. Pantokain, ein neues Lokalanästhetikum. Deutsche med. Wchnschr., 1931, v. 57, pp. 13-14.

[3] Reible, R. Pantokain, ein neues Oberflächenanästhetikum. Deutsche med. Wchnschr., 1931, July, v. 57, pp. 1327-1328.

[4] Lundy, J. S. and Essex, H. E. Experiments for anesthetics—Laboratory and clinical observations. Proc. Staff Meeting, Mayo Clinic, 1931, June, v. 6, pp. 376-380.

[5] Fussgänger, R. and Schaumann, O. Ueber ein neues Lokalanästhetikum der Novakainreihe (Pantokain). Arch. f. exper. Path u. Pharm., 1931, Jan. v. 160, pp. 53-65.

[6] Ernst, M. Erfahrungen mit dem neuen Lokalanästhetikum Pantocain. Münch. med. Wchnschr., 1931, Jan., v. 57, p. 15.

[7] Hirsch, C. Pantokain (2593), ein neues Oberflächenanästhetikum. Deutsche med. Wchnschr., 1931, Jan., v. 57, p. 15.

[8] Singer, R. Pantocain als Oberflächenanästhetikum. Wien. med. Wchnschr., 1931, Nov., v. 81, p. 1593.

[9] Tobeck, A. Unsere Erfahrungen mit dem neuen Lokalanästhetikum Pantocain als Schleimhautanästhetikum. Med. Klin., 1931, Jan., v. 27, p. 21.

[10] Theissing, G. Unsere Erfahrungen mit dem neuen Lokalanästhetikum Pantocain bei der Oberflächenanästhesie. Ztschr. f. Laryng. Rhin., 1931, Aug., v. 21, pp. 462-464.

[11] Kies, T. Erfahrungen mit einem neuen Mittel zur örtlichen Betäubung. Zentralbl. f. Chir., 1930, Dec., v. 57, pp. 3090-3095.

[12] Runge, H. G. and Schmidt, H. Pantocain, ein vollwertiger Kokainersatz. Arch. f. Ohren-Nasen- u. Kehlkopfh., 1931, Apr., v. 128, pp. 232-243.

[13] Pfitzner, H. Klinische Erfahrungen mit Pantokain. Zentralbl. f. Chir., 1931, May, v. 58, pp. 1116-1120.

[14] Schülein, M. Pantocain an Stelle von Novokain für den praktischen Arzt. München. med. Wchnschr., 1931, Aug., v. 78, p. 1475.

[15] Payr, E. Anästhesie für Oberbauchoperationen durch Pantocainfüllung der Bursa omentalis. Deutsche Ztschr. f. Chir., 1931, Nov., v. 234, pp. 130-136.

[16] Glees, M. Ueber die Wirkung des Pantokains auf das Auge. Klin. Monats. f. Augenh., 1931, Dec., v. 87, pp. 755-760.

CHANGES OF THE OPTIC NERVE RESULTING FROM PRESSURE OF ARTERIOSCLEROTIC INTERNAL CAROTID ARTERIES*

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CHICAGO

A study of the optic nerve in six cases of arteriosclerotic internal carotid artery, four with a distinct aneurysm, leads the author to conclude that visual disturbances are not likely to follow from the consequent pressure exerted upon the nerve, for the microscope shows only slight changes in the neural tissue. The literature is reviewed and discussed.
From the Department of Pathology of the Nelson Morris Institute of the Michael Reese Hospital and of the University of Illinois Medical School.

Introduction

During the routine autopsy examinations of older people, severe arteriosclerosis of the internal carotid and ophthalmic arteries is often encountered. Displacement of the optic nerves, changes in the form and compression phenomena of these nerves brought about by a marked arteriosclerosis or by aneurysms of the internal carotid arteries, however, constitute unusual findings. These changes have attracted but little attention from pathologists and are not mentioned in textbooks. Herein, the results of a study of the optic nerves in six cases, are reported. The nerves were thinned out and flattened and, in some instances, misplaced and grossly atrophic, apparently as a result of the pressure exerted upon them by the internal carotid arteries which were markedly sclerosed and, in some instances, were the seat of aneurysmal dilatation.

Literature

Michel[14] in 1877 was probably the first to describe changes in the optic nerves due to compression by the diseased internal carotid arteries. He stated that in a patient with the clinical diagnosis of edema of the papilla, a dilatation of markedly tortuous internal carotid arteries was found, which pressed upon the optic nerves. Histologically, there was a hyperemia and a diffuse round-cell infiltration of the optic nerves, with the nerve fibers, however, still preserved. The cellular infiltration was taken as possible evidence against the assumption that pressure alone produced the lesions.

Much of the literature on this subject is given in Wilbrand and Saenger's[23] handbook. In a very recent article, Alpers and Wolman[3] furnished a few additional references. Not mentioned in these articles are the following reports:

Bernheimer[4] in 1891 noted changes in the optic nerves apparently due to marked arteriosclerosis of the internal carotid arteries, which were found at postmortem examination of two old people.

Stölting[21] in 1905 described four patients whose clinical diagnosis was "a disease of the optic nerves resulting from arteriosclerotic changes of the internal carotid arteries". In only one of these cases was a postmortem examination done, but no details were given and no histological examination of the nerves was made. The three other patients were merely observed clinically but did not come to autopsy.

Klieneberger[12] in 1913 stated that atrophy of the optic nerves in cases of sclerosis of the internal carotid artery was primarily a pressure atrophy. Later, connective-tissue proliferation might occur.

Fuchs[7] in 1920 examined the optic nerves of six patients between the ages of seventy and eighty-two. He found foci of myelin-sheath degeneration, an increased number of glia cells, and occasionally, a marked thickening of the septa, a thinning and also disappearance of the nerve bundles in the peripheral portions. In only one case was there a formation of new blood vessels. He believed that the increase in septa was not absolute but rather relative, brought about by the disappearance of nerve fibers.

*Aided by a grant from the I. and K. Meyer Fund.

In 1922 Fuchs[8] reported that arteriosclerosis may cause atrophy of the optic nerve. Unlike tabes dorsalis, however, it does not lead to complete blindness. There might be a loss of the nasal field of vision.

Abelsdorff[1] in 1923 stated that atrophy of the optic nerve might occur in case of arteriosclerotic occlusion of the central artery.

Roenne[19] in 1924 remarked that changes in the optic nerve caused by arteriosclerosis of the internal carotid arteries are often found. These changes might, as a rule, produce longitudinal grooves which sometimes are deep enough to divide the nerve almost completely in two. Clinically, hemianopsia might be present.

Moore[15] in 1925 reported a case of an unruptured aneurysm of the ophthalmic and internal carotid arteries, which had caused rupture of the optic nerve. There is no histological description of the optic nerve.

Fileti[6] in 1928 reported the findings in a seventy-four-year-old female. There was a marked arteriosclerosis of the vessels of the base of the brain, and compression with flattening of the optic nerves. Histologically, the septa were thickened and occasionally the nerve fibers could not be stained.

Würdemann[25] in 1929 stated that in probably sixty percent of cases of optic atrophy, a tangible cause could not be found. However, no mention is made of the so-called arteriosclerotic atrophy of the optic nerve.

Favaloro[5] in 1929 stated that the compression of the optic nerves due to arteriosclerosis and aneurysmal dilatation of the internal carotid arteries is important to observe.

Igersheimer[11] in 1929 reported the disappearance of nerve fibers, and degeneration of myelin sheaths in an optic nerve. There also was a marked arteriosclerosis of vessels at the base of the brain and a cerebral hemorrhage. Because he could not demonstrate a marked circulatory change in the nerve, a disturbance in the tonus and contractibility of the internal carotid arteries seemed a possible explanation of the changes in the optic nerve.

Abelsdorff[2] in 1929 believed that atrophy as a result of pressure of sclerosed internal carotid arteries has been proved.

Woods and Rowland[24] in 1931 mentioned that either sclerosis or endarteritis of the nutrient vessels of the optic nerve may produce optic atrophy; but a histologic study or description of changes in the nerve is not given. They also referred to one case with atrophy of one of the optic nerves due to aneurysm of the internal carotid artery, while another case showed such an atrophy as a result of an aneurysm of a communicating vessel of the circle of Willis.

Alpers and Wolman[3] in 1931 described a case of compression of the optic nerves by sclerosed internal carotid arteries, apparently resulting in transient visual disturbances. Histologically, they found in the sheaths around the optic nerves small foci of lymphocyte-like elements. A myelin-sheath stain revealed the possibility of slight decrease in myelin but so slight as to seem unimportant. It was stated that arteriosclerotic disturbances of the optic nerve were probably not uncommon and might be the cause of unexplained visual disturbances in patients afflicted with arteriosclerosis.

Knapp[13], in the program notes of the American Ophthalmological Society held in Richmond, Virginia, June 1, 1932, stated as follows: "Optic atrophy with cupping, but without increased tension, is a puzzling condition. These cases are regarded as examples of atypical glaucoma, and the question of operating is difficult to decide. The association of this condition with calcification of the basal cerebral vessels was found present in ten cases, of which a report is added, and the definition of a clinical picture is attempted."

Material and Methods

The study here presented is based on the examination of optic nerves in six instances. Three patients were between seventy and eighty years old, the others sixty-seven, fifty-seven, and fifty years, respectively. All were male patients, none of whom showed any clinical

symptoms referable to eye disease. However, four were senile ward patients who were not asked specifically whether or not they noted any visual disturbances. The changes encountered were found incidentally during the course of routine postmortem examination. In every instance, the optic nerves and the chiasma were removed with the neighboring portions of the internal carotid and ophthalmic arteries, the dura, and the small wing of the sphenoid bone which contained the optic canal. The optic nerves were cut off close to the eyeballs. The nerves and portions of the chiasma were cut into small pieces, fixed in ten percent formalin and imbedded in paraffin. Serial sections were cut from every block. The first, sixth, etc., sections were stained with hematoxylin-eosin, the second, seventh, etc., according to the van Gieson method, the third, eighth, etc., for the presence of glia fibers by the use of the Holtzer stain, the fourth, ninth, etc., for myelin sheaths according to Weil's method, and the fifth, tenth, etc., for the presence of nerve fibers, using Davenport's stain.

Case Reports*

Case 1: A seventy-four-year-old male at necropsy revealed a marked generalized arteriosclerosis, coronary sclerosis, nephrosclerosis of the arteriolar variety, and marked hypertrophy and dilatation of the heart. The vessels at the base of the brain, especially both internal carotid and ophthalmic arteries, were markedly sclerosed and calcified. The arteriosclerosis of these vessels was diffuse, and no aneurysm was noted. Both optic nerves, beginning from the chiasma up to their entrance into the optic canal seemed flattened and thinner than normal, each measuring about 2 by 4 mm. in diameter. They were found in normal position. Within the optic canal, however, the nerves were found to be round and of about normal thickness. Histological examination of the optic nerves revealed an increase of connective-tissue and glia fibers on both sides. The nerve fibers were seen clearly everywhere, but the myelin sheath stains showed the sheaths indistinctly in only a few portions. The nerve bundles were smaller than normal. There were no cellular infiltrations. The arterioles within the sections showed no abnormalities. Along the septa of the nerves on both sides a large number of concentric bodies were found, which measured about 10 to 15 micra in diameter and were faintly stained with hematoxylin. Sections taken through portions of the optic nerves within the optic canal and from the chiasma revealed no changes.

Case 2: This seventy-one-year-old male at autopsy showed a generalized arteriosclerosis, nephrosclerosis of the arteriolar variety, and hypertrophy and dilatation of the heart. Both internal carotid and ophthalmic arteries were markedly sclerosed. Both optic nerves were flattened and thinned out, especially in the region where the nerves entered the optic canal. The right also was distinctly atrophic and averaged 2.5 mm. by 3 mm., while the left measured 3 by 4 mm. in diameter. Histological examination of the right optic nerve revealed a very slight increase in connective tissue and glial fibers. It could be demonstrated that the increase in glia was more pronounced in the central portion of the nerve than in the peripheral. There were no changes noticeable in the sections stained for the presence of myelin sheaths, and none of the sections revealed any inflammatory cells. Many concentric bodies similar to those described before were seen throughout the septa of both nerves. Occasionally, concentric bodies were also found in the dural sheaths in those sections which were taken through portions of the optic nerves within the optic canal. The arterioles throughout appeared normal. Histological examination of the left optic nerve and chiasma showed no noteworthy changes.

Case 3: This was a fifty-year-old male who died of cerebral hemorrhage. The vessels at the base of the brain were markedly thickened, rigid, and calcified. The left carotid artery

*I am indebted to the Medical Department of the Michael Reese Hospital for the clinical records.

showed, in the region where the ophthalmic artery comes off, a circumscribed dilated area with firm walls. There was a distinct compression of the left optic nerve in this region, which was thinner than normal, measuring 2 by 3 mm. in diameter. It was, however, in normal position. The right optic nerve also was thinner than normal, measuring 3 by 4 mm. in diameter, but otherwise showed no changes. On histological examination, only those portions of the left optic nerve which were taken from the region of the compression revealed an increase in glia and connective-tissue fibers, and there also was a very slight degeneration of the myelin sheaths, more confined to the central portions of the nerves, while the peripheral bundles contained normal myelin sheaths. The central bundles also were smaller than normal, apparently compressed. The septa in these regions seemed thicker than those found in the periphery. No cellular infiltration was observed. Sections of the optic nerve taken from those portions found within the optic canal revealed a large number of concentric bodies within the surrounding dural sheath, but no changes were found in the nerve itself. Sections taken through the right optic nerve showed a slight increase in glial fibers, but otherwise no changes. The arterioles in both nerves revealed no abnormalities, and the chiasma also appeared normal.

Case 4: This was a fifty-seven-year-old male. The cause of death was coronary thrombosis and myocardial infarction. The arteries at the base of the brain, and especially both internal carotid and ophthalmic arteries were markedly sclerosed. The left internal carotid presented a saccular aneurysm in the region where the ophthalmic artery branched off. It was located so close to the left optic nerve as actually to compress it. In this region the nerve was also thinned out and displaced medially (fig. 1). The right optic nerve between the chiasma and the optic canal was flattened. The diameters of the left optic nerve averaged 2 by 3 mm., those of the right 2 by 4 mm. Histologically, the left optic nerve, in the region of the aneurysm of the carotid, revealed thickened septa. The nerve fibers were everywhere clearly recognizable, but the inner bundles seemed thinner than normal. The myelin sheaths could be made out everywhere but did not stain well in the region of the compression. There was a distinct increase of glial and connective-tissue fibers. The arterioles within the optic nerve showed no changes. In a few sections which were taken from the region of the compression, a very slight perivascular infiltration of lymphocytes was noted. A number of basophilic concentric bodies simi-

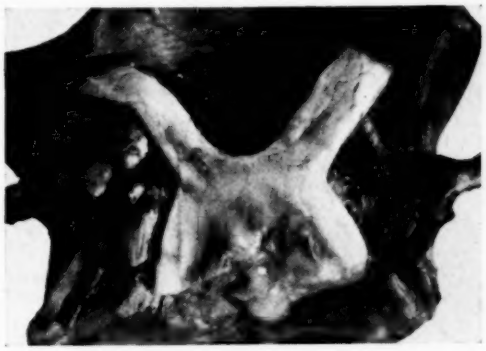

Fig. 1 (Saphir). Displacement and compression of the left optic nerve. Aneurysm of the left internal carotid artery (Case 4).

lar to those described before were noted along the septa. Sections taken from the right optic nerve also revealed a moderate increase of glial and connective-tissue fibers and concentric bodies along the septa; but no inflammatory cells were demonstrable. Sections taken from the portions of the optic nerve found within the optic canal, and from the chiasma showed no changes.

Case 5: This was a sixty-seven-year-old male who died of cerebral hemorrhage. There was marked arteriosclerosis of the vessels at the base of the brain. The left internal carotid artery showed an aneurysmal dilatation close to the left optic nerve (fig. 2). Also, the walls of the ophthalmic arteries were considerably thickened and calcified. The left optic nerve, in the region of the aneurysmal dilatation of the internal carotid artery, was compressed, hollowed out, thin, and seemingly pushed over

towards the midline. It averaged 2 by 3 mm. in diameter. The right optic nerve also was thinned and flattened, measuring 2 by 4 mm. in diameter. The superficial veins of both optic nerves were somewhat prominent. Histological sections of the left optic nerve showed a

Fig. 2 (Saphir). Compression and thinning of the left optic nerve. Aneurysm of the left carotid artery (Case 5).

distinct increase of connective-tissue and glial fibers, especially pronounced in the region of the compression. The central bundles, by the use of the myelin sheath stain, were lighter stained than the peripheral portion. The individual nerve bundles in the center seemed smaller than normal; no inflammatory cells were observed. Only a few concentric bodies were found in the septa of the optic nerves. The arterioles revealed no changes. There was a slight increase in glial and connective-tissue fibers in the right optic nerve, and many concentric bodies were present; but otherwise no changes could be demonstrated. Sections taken from the chiasma showed only a few circumscribed areas of recent hemorrhage. The portions of the optic nerve located within the optic canal revealed no changes.

Case 6: A seventy-five-year-old male died of coronary thrombosis and myocardial infarction. There was a marked arteriosclerosis of the vessels at the base of the brain, with special involvement of both internal carotid arteries. A distinct widening of the left carotid artery was observed (fig. 3). The left optic nerve beginning at the chiasma up to its entrance into the optic canal was flattened, in some portions thinner than normal, and displaced medially. It seemed to have been pressed towards the upper free margin of the membranous part of the optic canal where the flatness attained a considerable degree. When the nerve was removed, a distinct dent was found at the point corresponding to the margin of the optic canal. The nerve measured about 1 by 3 mm. in diameter. The right optic nerve also was flattened and thinned, but otherwise showed no gross changes; it measured about 2 by 5 mm. in diameter. The superficial veins of both nerves were prominent. On histological examination, the left nerve showed a moderate increase in connective-tissue and glial fibers, mainly pronounced in the central portion most remote from the point of compression. The myelin sheaths within the center of the nerve were less clearly noticeable than the ones in the periphery. The nerve fibers, however, were normal, and the arterioles showed no changes. There was no evidence of inflammatory cells. Only occasionally, concentric bodies were found along the

Fig. 3 (Saphir). Flattening of both optic nerves. The left is pressed against the upper free margin of the membranous portion of the optic canal (Case 6). Note the widening of the left internal carotid artery and hyperemia of the superficial veins.

septa. The right optic nerve revealed, with the exception of the presence of concentric bodies, no histopathological changes. Sections taken from those portions of the optic nerves found within the optic canal, and also from the chiasma showed no abnormalities.

Discussion

In all cases, gross changes in the optic nerves were found, consisting in distinct flattening, thinning, compression, and in some instances in narrowing and actual displacement. The internal carotid arteries revealed severe arteriosclerotic lesions, with four instances of aneurysmal dilatation. An actual impression of the aneurysms on the optic nerves was also noted. The signs of compression were especially pronounced in those portions of the optic nerves which were situated between the internal carotid arteries and the membranous parts of the optic canal. The latter is formed, according to Abelsdorff[2], by a fibrous connective-tissue cord which bridges over the anterior clinoid processes and the limbus sphenoidalis. The connective-tissue cord is surrounded by the dura, which forms a roof over the optic nerve. This membranous upper margin of the optic canal is very firm and sharp. In this region the internal carotid artery forms an arch, the convexity of which is directed towards the optic canal, and from which the ophthalmic artery branches off. At this point, the temporal portion of the optic nerve touches the

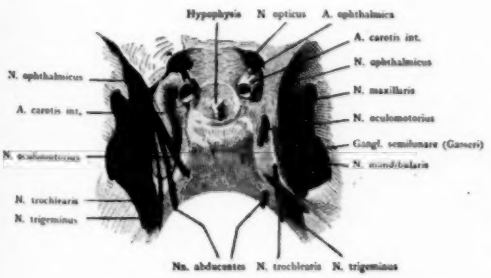

Fig. 4 (Saphir). Topographical relation between the optic nerve and internal carotid and ophthalmic arteries. (From H. K. Corning's Lehrbuch der topographischen Anatomie.)

internal carotid artery. Abelsdorff[2] stated that the optic nerve in this region, because of its relations to the arteries and the rigid optic canal, is especially disposed to pressure phenomena. All of our cases showed the pressure marks noticeably in this region, particularly Case 6 (fig. 3) in which a dent in the nerve bore witness to the pressure the sharp margin must have exerted upon the nerve.

In addition to the changes in form, hyperemia of small veins in the superficial portions of the nerves was noted in some cases. This hyperemia might also

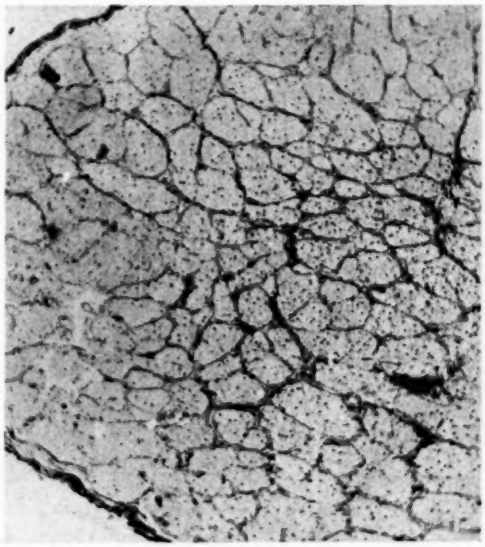

Fig. 5 (Saphir). Thickened septa and compression of the central bundles of the optic nerve (left optic nerve, Case 3). Holtzer stain (×60).

constitute a pressure phenomenon and indicates an impaired venous return.

Histologically, the changes in general were much less marked than would have been suspected from the gross picture. Only occasionally, a slight perivascular lymphocytic infiltration was found. It might be mentioned, however, in this connection that none of our cases revealed any evidence of syphilis in any of the organs examined and that the aneurysms were of arteriosclerotic origin. The more constant finding was a slight increase in glial and connective-tissue fibers. In some instances, the central bundles of the nerve seemed compressed, and the septa in the central portions were thicker than those seen in the periphery. In several cases the degeneration was more pronounced in the central bundles of the nerves as compared with the ones in the periphery. A similar observation was also

made by Otto[17, 18]. The portions of the optic nerves taken from within the optic canal revealed neither gross nor histologic changes. To summarize, it may be stated that the optic nerves appeared smaller and often flattened, but that histologically, with occasional exceptions, the cross sections appeared only as a "miniature picture" of a normal nerve, but otherwise showed no noteworthy lesions.

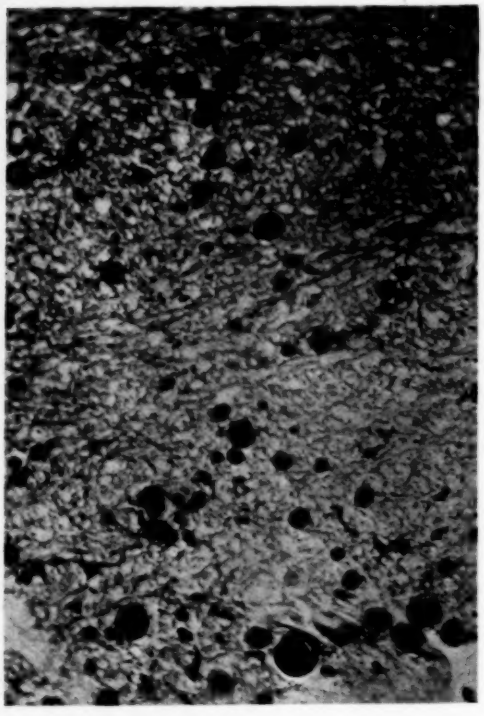

Fig. 6 (Saphir). Corpora amylacea (left optic nerve, Case 4). Hematoxylin-eosin stain (×250).

It might also be of interest to point out the marked arteriosclerosis of the internal carotid and ophthalmic arteries, with aneurysms in some instances, as contrasted with the unchanged arterioles within the optic nerves themselves. Alpers and Wolman[3], and others stated that arteriosclerosis might affect the optic nerve in two ways, either by direct compression of the nerve by sclerosed internal carotid arteries or by sclerosis of arterioles within the nerves themselves. All our cases showed only results of direct compression, but no nutritional disturbances were noted. Pressure atrophy without accompanying vascular disturbances is considered rare. The lack of edema, the rarity of cellular infiltrations, and the very slight histological changes encountered, however, may indicate merely the effects of pressure. The fact that the individual nerve bundles often were smaller than normal without appearing otherwise changed might also speak for pressure as the cause responsible for the abnormalities. Also, Hippel[10] more recently stated that the changes in the optic nerve were purely the result of pressure.

Otto[17, 18] mentioned ascending and descending degeneration in the optic nerve as a result of pressure occurring at the point of compression. Hippel[10], however, stated that an ascending and descending degeneration of the nerve was suspiciously slight as compared with such degenerations from other causes. In none of the herein-reported cases could such a degeneration be found with certainty, apparently because of the very slight changes at the point of compression.

Concentric bodies were often found within the optic nerves. According to their morphology and location, they are characteristic of so-called corpora amylacea. Stürmer[22], Obersteiner[16], and also Abelsdorff[2] described them in detail. They were found, in my material, diffusely within the optic nerves and not only where histological changes were demonstrable. There was no relation between their presence and the degree of histologic alteration. It may be worth while mentioning that in Case 5 only occasionally were corpora amylacea found in the left optic nerve, which showed histologic lesions, while many corpora amylacea were present in the right nerve which, histologically, was practically normal. It might also be mentioned that corpora amylacea could be found in Case 3 which was the one of a fifty-year-old male, the youngest in our series. Whether nutritional and circulatory disturbances play an important part in the causation of the corpora amylacea, or whether the slight degenerative and atrophic changes are of etiologic importance for their forma-

tion, cannot be decided. However, neither marked nutritional nor circulatory disturbances could be demonstrated in these cases, so that it does not seem likely that such changes are responsible for the appearance of corpora amylacea. Using the classification of Abelsdorff, the concentric bodies found in the dural sheaths must be termed corpora arenacea.

In several reports in the literature, visual disturbances were traced back to the compression of the optic nerves by arteriosclerotic internal carotid arteries, and one repeatedly finds the statement that unexplained visual disturbances might be accounted for by the changes of the optic nerve due to compression. Fuchs[8] stated that these changes might cause a nasal hemianopsia, but in contradistinction to tabes dorsalis they did not lead to blindness. Stief[20] held that nasal or binasal defects in the visual fields were always referable to arteriosclerotic changes provided syphilis and other etiologic factors were absent. Wilbrand and Saenger[23] stated that the nasal fields of vision mainly revealed defects but that the temporal field might also show defects. They emphasized that if one saw in an arteriosclerotic individual, in addition to other nervous disturbances, a uni- or bilateral atrophy of the papilla and also defects in the nasal field of vision, one might assume an atrophy of the optic nerve as a result of arteriosclerotic changes of the internal carotid arteries or of branches of the circle of Willis. Because of the fact that the internal carotid arteries lie lateral to the optic nerves it seems at first logical to expect a nasal hemianopsia. But, as was observed by Otto[17, 18] and as described here, the inner bundles of the nerves were more involved than the outer portions. Under these conditions, one would rather expect clinical findings referable primarily to changes in the macula than visual-field disturbances. This objection was also raised by Heinrichsdorff[9]. However, the changes encountered here and the ones reported by others were so slight that this alone makes it seem unlikely that decided visual disturbances are caused by pressure of arteriosclerotic arteries upon the optic nerve. In view of these findings it may be of interest to point out that early and recent writers after they had examined the optic nerve at necropsy state that even though clinical changes were not observed in their respective patients, the anatomical findings indicate that unexplained visual disturbances encountered in other patients might find their solution in changes of the optic nerves due to severe arteriosclerosis of the internal carotid arteries. My study, however, does not justify such a statement because of the very slight histological changes even in those optic nerves which showed marked gross deformities.

The changes here described are referred to in the literature as "arteriosclerotic atrophy of the optic nerves". Such a nomenclature is ambiguous. It may signify changes in the optic nerves caused by arteriosclerosis of the nutrient vessels, changes which secondarily produce atrophy of the nerves. Arteriosclerotic atrophy, however, more commonly is regarded as pressure atrophy due to diseased internal carotid arteries. To avoid a misinterpretation, the rather clumsy but more explanatory title "changes of the optic nerves resulting from pressure of arteriosclerotic internal carotid arteries" is used.

Summary

The literature on changes of the optic nerve resulting from pressure of arteriosclerotic internal carotid arteries is reviewed. The result of a study of six such cases is reported. The carotid arteries were markedly sclerosed and in four instances revealed an evident aneurysm. The optic nerves grossly were compressed, medially displaced, flattened and thinned out. Histologically, the changes were very slight and consisted of a moderate increase in glia and connective-tissue fibers and an occasional myelin-sheath degeneration affecting mainly the centrally located bundles. Gross and histologic lesions in the optic nerve were encountered only in those portions of the nerve extending between the chiasma and the optic

canal. Because of the slight histological changes and in view of the fact that in none of the cases was an impairment of sight recognized clinically, though it is realized that slight defects in the visual field are often not noted by the patient, it is unlikely that visual disturbances, if present in old people, should often be explained by lesions in the optic nerves resulting from pressure of arteriosclerotic internal carotid arteries.

References

[1] Abelsdorff, G. Sehnervenatrophie durch atherosklerotischen Verschluss der Zentralarterie. Ztschr. f. Augenh., 1923, v. 52, p. 273.

[2] ———. Sehnerv, in Henke and Lubarsch's Handbuch der speziellen pathologischen Anatomie und Histologie. Julius Springer, Berlin, 1928, v. 11.

[3] Alpers, B. J., and Wolman, I. J. Arteriosclerotic disease of the optic nerve. Arch. of Ophth., 1931, v. 6, p. 21.

[4] Bernheimer, St. Ueber Sehnervenveränderung bei hochgradiger Sklerose der Gehirnarterien. Arch. f. Ophth., 1891, v. 37, pt. 2, p. 37.

[5] Favaloro, G. Sulla patogenesi delle affezioni delle vie ottiche con particolare riguardo alle affezioni da compressione. Ann. d. ottal. e. clin. ocul., 1929, v. 57, p. 354.

[6] Fileti, A. Contributo alle conoscenze delle lesioni da arteriosclerosi dell' arteria oftalmica. Atti. d. congr. d'oftalmol., Roma, Oct. 14-16, 1926. Ref. in Zentralbl. f.d.ges. Ophth., 1928, v. 19, p. 710.

[7] Fuchs, E. Ueber senile Veränderungen des Sehnerven. Arch. f. Ophth., 1920, v. 103, p. 304.

[8] ———. Augensymptome bei Arteriosklerose. Wien. med. Wchnschr., 1922, v. 16, p. 681.

[9] Heinrichsdorff, P. Ueber Veränderungen der Sehnerven durch Arteriosklerose an der Schädelbasis. Klin. Monatsbl. f. Augenh., 1914, v. 53, p. 513.

[10] Hippel, E. v. Die Krankheiten des Sehnerven, in Axenfeld and Elschnig's Handbuch der gesammten Augenheilkunde. Julius Springer, Berlin, 1923, v. 7, pt. 2.

[11] Igersheimer, J. Sehnervenerkrankung bei maligner Sklerose. Ztschr. f. Augenh., 1929, v. 69, p. 47.

[12] Klieneberger, O. Optikus Atrophie bei Gehirnarteriosklerose. Monatschr. f. Psychiat. u. Neurol., 1913, v. 33, p. 519.

[13] Knapp, A. On the association of sclerosis of the cerebral basal vessels with optic atrophy and cupping: Report of ten cases. Program of the Amer. Ophth. Soc., Richmond, Va., June 1, 1932.

[14] Michel, J. Ueber einige Erkrankungen des Sehnerven. Arch. f. Ophth., 1877, v. 23, p. 213.

[15] Moore, R. F. A case of unruptured intracranial aneurysm which had caused rupture of the optic nerve diagnosed during life. Trans. Ophth. Soc. U. K., 1925, v. 45, p. 490.

[16] Obersteiner, H. Einige Bemerkungen über die Genese der Corpora amylacea des Nervensystems. Arb. a. d. neurol. Inst. a. d. Wien. Univ., 1916, v. 21, p. 479.

[17] Otto, R. Sehnervenveränderungen bei Arteriosklerose und Lues. Arch. f. Augenh., 1901, v. 43, p. 104.

[18] ———. Untersuchungen über Sehnervenveränderungen bei Arteriosklerose. Julius Springer, Berlin, 1893.

[19] Roenne, H. The clinical symptoms of arteriosclerotic atrophy of the optic nerve. Acta Ophth., 1924, v. 2, p. 160.

[20] Stief, A. v. Zur Histopathologie des Sehnerven bei der Arteriosklerose und senilen Demenz. Ztschr. f. Augenh., 1929, v. 70, p. 41.

[21] Stölting, B. Beitrag zur Klinik der Sehnervenerkrankungen infolge von Gefässatheromatose. Klin. Monatsbl. f. Augenh., 1905, v. 43, p. 113.

[22] Stürmer, R. Die "Corpora amylacea" des Zentralnervensystems, in Nissl and Alzheimer's Histologische und histopathologische Arbeiten über die Grosshirnrinde. G. Fischer, Jena, 1913, v. 5, p. 417.

[23] Wilbrand, H. and Saenger, A. Neurologie des Auges. J. F. Bergman, Wiesbaden, 1913, v. 5, p. 475.

[24] Woods, A. C. and Rowland, W. M. An etiologic study of a series of optic neuropathies. J.A.M.A., 1931, v. 97, p. 375.

[25] Würdemann, H. V. Optic nerve atrophy from remote causes. Eye, Ear, Nose and Throat Monthly, 1929, v. 8, p. 345.

PREMONITORY LID EDEMA IN THE TYPHOID GROUP

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The author cites two cases which came under his observation, the edema appearing several weeks before the bacilli were recovered in the stools, and several days before abdominal tenderness was noted, at which time the edema had disappeared. Read before the American Ophthalmological Society, New London, June 27, 1932.

There exists a tradition that edema of the eyelids occurs as a manifestation of typhoid fever. While I have found no documentary evidence to substantiate this, I have more than once heard it mentioned. At what period in the disease the edema is found, the nature, extent, and appearance of the swelling, and its duration, seem unknown. Competent observers dismiss the notion as not worth notice. Therefore, having observed the phenomenon in two interesting cases, and furthermore having found in the literature the account of an epidemic[1] susceptible of this interpretation, I am placing it on record. These cases and the description of the epidemic, alike indicate that the edema may be the earliest symptom of the disease, and therefore highly important as regards diagnosis; that it is a soft, painless, noninflammatory, bilateral swelling extending to adjacent parts of the cheeks and forehead; and lasting only a few days. In these instances the swelling has disappeared before any evidence suggestive of typhoid has appeared—in fact, before the patients have felt ill. Pyrexia has, however, always been present.

The cases were seen in my clinic at the Maine Eye and Ear Infirmary. The first case was admitted in September, 1923, and was mentioned in a paper on "Lid edema" at the seventy-fifth session of the American Medical Association. The diagnosis in this case was made by Dr. J. L. McAleny, who on the tenth day of the disease obtained a positive agglutination test for paratyphoid fever.

Case 1. A woman twenty-two years of age had had a few days of painless swelling of the lids and cheeks. It was worse in the morning and on the right side.

Examination revealed a symmetrical swelling of the lower lids, extending on the cheeks below the zygoma. There was no tenderness or redness. There was no disturbance of the urine, parotid, tear passages, nose and throat, or teeth.

Two days later the temperature was 101°; the pulse 96; some lassitude. The Widal test was negative.

Subsequently the spleen became enlarged, and the paratyphoid agglutination test positive. Gradual recovery took place in four weeks.

At this time several links in the evidence were lacking. While the edema seemed to be part of the syndrome there was no absolute proof that it was more than a coincidence. It was not even certain that the patient was actually having paratyphoid, as it was remotely possible for her to have carried the agglutination reaction from some earlier attack. Then the apparent silence of the literature was a reasonable objection. If such a phenomenon existed, how could it so long have eluded recognition? It is true that Elgood had reported his epidemic just referred to, and pointed out the similarity to typhoid fever. Yet, owing to too great dependence on the laboratory, he had fallen just short of coming out with the diagnosis. In my first report[2] I ventured an opinion to this effect, but lacked the evidence of my second case to support it.

It was therefore rarely fortunate that data missing in the first case should be supplied to such an unusual degree in the second. There is no possible question of the genuineness of this attack of typhoid fever. Not only was Widal's test positive, but typhoid bacilli were recovered from the stools. Both these signs, furthermore, were absent early in the disease, not appearing until the end, proving absolutely that they had not been carried from a previous infection. In the next place, the illness ran a course so identical with that of Elgood's cases as to warrant giving his report most serious consideration.

Case 2. A housemaid, aged twenty-seven years, complained on December 1, 1925, of swelling of the lids. She first noticed the trouble two days before, on November 28. The swelling was painless; it involved all the lids, extending to the forehead and temples. The conjunctivae were slightly gelatinous below, and possibly a bit dusky. Otherwise the edema was colorless, though the patient believed it to have been red. The temperature was 100°; the pulse 100. Dermatological conference with Dr. Benjamin B. Foster, and general physical examination by Dr. E. R. Blaisdell, revealed nothing significant. Urine examination showed a slight trace of acetone and the slightest possible trace of albumen, but with nothing pathological in the sediment. The white count was 8,600; breathing normal, heart normal, spleen not felt; no abdominal tenderness. The tear sacs, nose, throat, and teeth were not involved.

Her progress sheet shows these salient dates:

December 3. Widal negative. Edema of the lids almost gone. Pain in stomach.

December 5. Widal doubtful. Very uncomfortable.

December 8. Widal and paratyphoid A.—slight agglutination; paratyphoid B.—no agglutination.

December 15. Last day of elevated pulse and temperature.

December 21. B. typhosus recovered from stools. Paratyphoid B. not found.

December 23. Dressed. B. typhosus not found.

December 26. Widal—complete agglutination 1:640. Paratyphoid B. agglutination 1:60.

December 28. B. typhosus found.

December 29. Discharged to authorities of home town.

After analyzing this history it becomes quite clear that in ordinary practice no observer would have been likely to suspect the edema of any connection with typhoid fever. A young woman presented herself, complaining only of swelling of her eyelids. She had no abdominal evidence of typhoid, such as pain, tenderness, enlarged spleen, or rose-spots. There was no headache, malaise, lassitude or other indication of typhoid except a pulse of 100 and temperature of 100°. Because this pulse-temperature relationship is appropriate for typhoid fever, and noting the resemblance to Case 1, I had her admitted to the wards, posting "enteric precautions". Even now, with full knowledge of the outcome, I must admit that my colleagues were justified in some mild amusement at this order. By December 4, when she felt the first suggestion of abdominal uneasiness, the lid swelling which started six days before was no longer evident. Now suppose that she had been an average patient. In a few days she would be seeking relief for her increasing distress. With her attention fixed upon the abdominal condition, she would hardly be apt to mention to the physician that her lids had been swollen. So that even if he had recognized the disease, the initial edema would not have come to notice. In this case, however, recovery is seen to have occurred before the diagnosis had been established. Elevation of pulse and temperature ceased on December 15, the seventeenth day after onset. It was a week more before typhoid bacilli could be found in her stools, and two weeks before the Widal reaction became tardily but strongly positive. The natural course would be to discharge her at the termination of the fever, without submitting her to further laboratory investigation. Under ordinary conditions, therefore, an observer could not be expected either to see the connection between the swelling and the typhoid, or to identify the typhoid fever. This is the reasonable explanation of what happened in Elgood's epidemic. In the light of this case his account and the preceding one of Spriggs[3] by which he was inspired, take on fresh significance. Spriggs mentioned ten cases of his own, forty of one colleague, and one of another. Detail is lacking to warrant any inferences bearing on this report. Many of the cases might well have been influenza, as Spriggs thought, possibly complicated by nasal or sinus infection. Others more nearly resembled these under discussions. Elgood refrains from commenting on Spriggs's interpretation, merely saying of his own cases—"the symptoms . . . were hardly such as to suggest an influenzal origin." He then goes on to say, "In three cases in which the fever was unusually prolonged a *suspicion of enteric fever was aroused*, but when the blood was tested for *Widal's reaction the result was negative*". Most of the force of this reasoning is lost now that we find, as in Case 2, that Widal's reaction can be negative at the end of a month, while the longest of

Elgood's cases lasted but three weeks. No mention is made, moreover, of any test for paratyphoid infection. Elgood's summary of his nine or ten cases will be found quite characteristic of a mild ambulatory epidemic of enteric fever. He mentions "some disorder of the bowels, either diarrhea or constipation, with flatulent distension . . . edema of the eye-lids, early and transient . . . fever in two cases, 103° . . . no case suddenly prostrated . . . all walking about in febrile condition when first observed . . . shortest period of illness ten days . . . longest three weeks".

In these cases, as in mine, it will be noted that the lid swelling is "early and transient".

Edema of the lids, however, later in the course of the fever has been mentioned. Dr. A. G. Hebb[4] of Bridgton, Maine, observed an epidemic in Brooklyn in 1898 characterized by transitory lid swelling after the typhoid symptoms were well developed. The sign is, of course, of greatest value when it serves as a warning by ushering-in the attack. Several interesting speculations are suggested by these observations:

1. Why should this edema occur in epidemics? Is some special strain of B. typhosus more prone to cause the lids to swell?

2. Are young adults about the third decade particularly susceptible?

3. Are mild epidemics more apt to show this phenomenon so that early edema has favorable prognostic significance?

While there is nothing in the data at hand to answer these questions, they demonstrate the need of more careful differential diagnosis in edema of the eyelids.

It is a complication of several obscure conditions, such as trichinosis* and the ingestion of rat poison (thallium). Valuable information may often be gained from observation of the color, distribution, consistency and course of the edema.

704 Congress street.

*Dr. Carter of Detroit (private communication) tells of an ambulatory patient in some clinic, having vague general pains, lid swelling and pyrexia, classed as trichinosis. No attention was paid to complaints of repeated nose-bleed. In the days when diagnosis was made from clinical signs, epistaxis was recognized as a characteristic and early indication of typhoid fever. This patient disappeared, so the outcome is not known. Certainly the possibility of typhoid should have been considered.

References

[1] Elgood. Edema of the eyelids with pyrexia. Brit. Med. Jour., 1909, v. 1, p. 88.
[2] Beach, S. J. Edema of the eyelids. Trans. Amer. Med. Assoc., Ophth. Sect., 1924, p. 138.
[3] Spriggs, N. I. Epidemic of influenza characterized by edema of the eyelids. Brit. Med. Jour., 1908, v. 2, p. 1744.
[4] Hebb, A. G. Private communication.

MANAGEMENT OF DENSE SECONDARY CATARACT

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LOS ANGELES

A keratome incision is made at the upper limbus, iris adhesions are freed with a knife-needle; a sharp hook is introduced low down into the capsule which is then drawn upwards through the incision and cut off. Three cases are reported. Read before the Eye, Ear, Nose, and Throat Section of the California Medical Association, at the sixty-first Annual Session, Pasadena, May 2-5, 1932.

Prior to the present general substitution of capsulotomy forceps for the cystotome in the extraction of senile lenses, about 25 percent were estimated as being followed by secondary cataracts of appreciable opaqueness. Now that operative technic has improved the incidence has undoubtedly decreased. Most of these are of slight, or moderate, thickness, and respond favorably to a well-selected discission. Dense secondary cataracts, however, still occur, do not respond so favorably to any form of discission, and do not have clear black pupils as an operative result. Their removal by forceps, or scissors, is not always easy or satisfactory. These membranes frequently are a source of much anxiety to ophthalmic surgeons who still prefer capsulotomy extractions. Quite recently William Hardy[1] has stated, after reviewing ophthalmic literature, that "capsulotomies are still holding their ground". The choice of this operative method is evidently often made regardless of the many acknowledged advantages of a skillfully performed intracapsular extraction.

It is not my purpose to discuss the relative merits of the two technics, but rather to suggest a two-stage intracapsular operation to those who, from choice or necessity, still do capsulotomies. There is little new or original in the method, but apparently it is seldom used for removal of these dense membranes except as a last resort. Simplicity and safety should recommend it to those who rightly dread these troublesome sequelae. The postoperative result is usually good vision, a black pupil, and an undamaged vitreous. A clear opening may at times be obtained by one of the various forms of deep discissions, but a black pupil is not a possibility and both the hyaloid membrane and the vitreous must necessarily be damaged. It is now known from slit-lamp studies that the vitreous body is a true tissue, not simply a semi-fluid mass, and injury to it should be prevented, not deliberately inflicted.

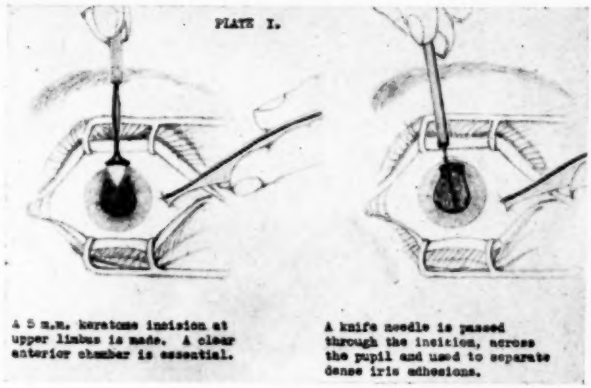
In a recent review of the literature, the writer has become conscious of the little consideration given to the complete removal of these membranes. De Schweinitz[2] refers to a method employed by Dr. C. R. Agnew, who fixed the membrane with a broad needle for an anchorage, then, through a corneal opening at the opposite margin, a sharp hook was used to tear and roll up the membrane. It was then cut away. Jackson[3] also mentions the use of the sharp hook as an extractor. The descriptions of these procedures give one an idea that much tearing and pulling is required. Our experience has been quite the reverse. We have, on the contrary, been struck with the ease of their separation and complete removal, when a line of cleavage has been found. Barkan[4] has recently drawn our attention to its advantages as one of several well-known technics. The details of the operation, as suggested by him, differ only from the one done by Dr. Irvine and myself in the location of the corneal incision. He places it in the cornea, while we prefer the incision at the limbus. As most operators do a complete iridectomy in a capsulotomy extraction, the limbus incision permits easier access to the upper portion of the membrane.

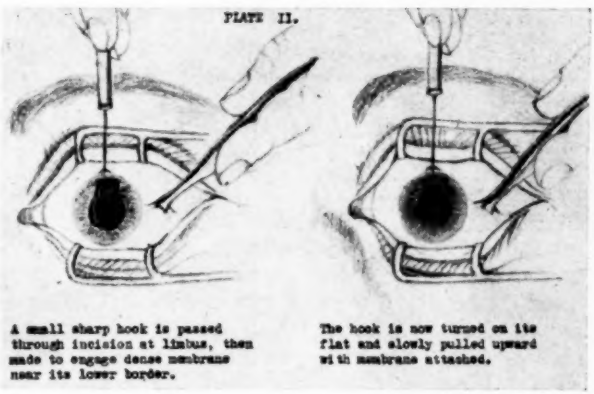
The accompanying descriptive photographs*, together with a few brief case histories, the postoperative results, and a digest of some additional case his-

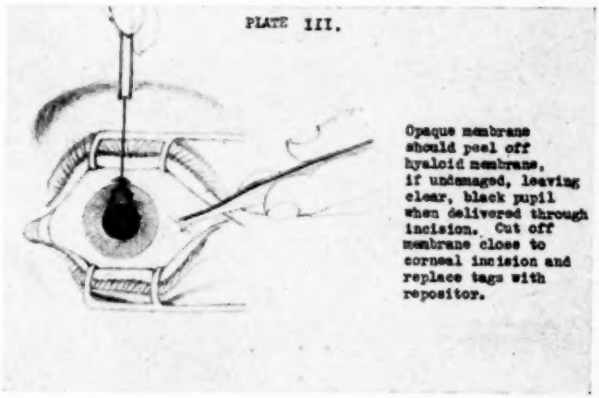
* Sketches made by Miss M. H. Van Raalt.

tories, are presented to illustrate some of the advantages of the use of a sharp hook. In all but one of six consecutive cases, the hyaloid membrane was left intact, with a flat surface, few striae and practically a black pupil. Our faulty technic was responsible for the one exception. The end result was, nevertheless, excellent with full vision for distance and near. Even in those cases where full normal vision was not obtained, the pupils were black. Uveal changes, which had taken place during the formation of the secondary cataract could be justly held responsible for the imperfect visual result. All patients obtained vision of 6/15 or better; three obtained vision of 6/4.

Description of method: Thorough general preparation of the patient, with special search for, and elimination of, probable foci of infection. Such local measures as may seem indicated. Local anesthesia obtained by instillation of a few drops of 5 percent butyn solution, followed by a subconjunctival injection of two or three minims of equal parts of 4 percent cocain solution, and adrenalin chlorid solution (1-1000) above the limbus. Plates I, II, and III illustrate and describe the succeeding steps in detail.

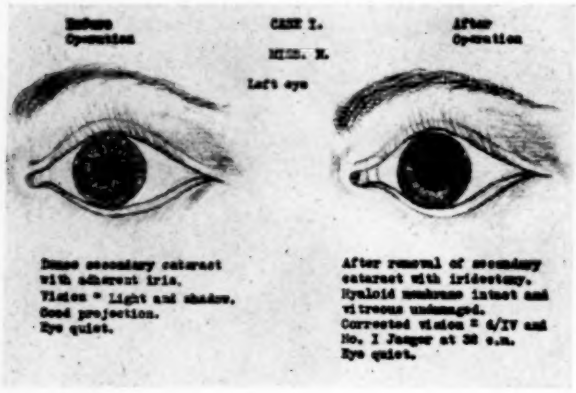




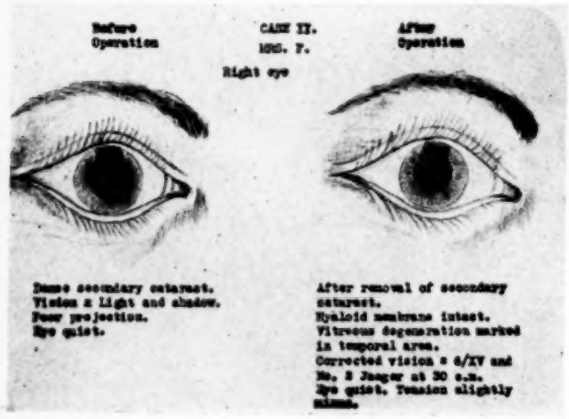


Case I. Miss N., aged forty years: Eyes were apparently normal until 1926 when she noticed dimness of the left eye. A diagnosis of a cataract was made. The cataract matured rapidly and was needled. The postoperative course was stormy, ending in contracted iris adherent to dense lens material. Vision was light and shadows only, with good projection. Past history revealed a mild form of pulmonary tuberculosis, now quiescent. Tonsils had been completely removed. Teeth were excellent; none dead. Physical condition was good. She was referred to me for removal of left lens which had not successfully responded to an ill-advised needling. On June 25, 1931, through a keratome incision 1 mm. above limbus, a complete iridectomy was performed. Using a knife needle, several dense iris adhesions were separated and the posterior capsule at its attachment below to the iris was incised. With a small sharp

hook the posterior capsule and attached lens material were slowly pulled out through the keratome opening, leaving a black pupil. Corrected vision was 6/4 and No. 1 Jaeger was read at 32 cm. No operative damage to the hyaloid membrane was seen with the slitlamp. The surface of the hyaloid was flat with a few vertical striae and on it were some discrete brown pigment spots. The vitreous was normal.



Case 2. Mrs. F., aged eighty-three years: History on January 8, 1930, was that for several years vision had been poor, but she could see to read with right eye until recently when the vision of this eye was suddenly lost, only light perception remained; poor projection temporally. Two years previously, while chopping wood, a piece had struck above the left eye; the anterior segment of the eye was undamaged but optic atrophy developed, reducing vision to fingers at one foot. All teeth were out. Tonsils were uninflamed. Physical condition was fair, except for marked arteriosclerosis. Examination showed a mature cataract right eye with fair light projection; Left eye, incipient cortical cataract with well-marked optic atrophy. Removal of right cataract with iridectomy and capsulotomy was performed, followed by irrigation of anterior chamber. The lens was soft. Operation was uneventful. On fourth postoperative day there was pain in this eye. It was then dressed and considerable lens remnants were visible. Otherwise the eye was quiet and progress satisfactory. However, vision was unimproved because of lens remnants and thickened posterior capsule. On May 9, 1931, through a keratome incision, the capsule adherent to the lower border of the iris was separated with a knife needle and the thickened lens capsule was delivered with a small hook, leaving a clear, black pupil. The hyaloid was intact with surface flat. Discrete brown pigment spots on its surface were visible with a slitlamp. The vitreous contained much floating material, and a circumscribed mass of degenerated vitreous was visible in the nasal sector, suggestive of a previous hemorrhage. Low-grade, retinochoroidal changes with moderate arterio-sclerosis were visible. Recently this woman has had a cerebral hemorrhage within the left internal capsule with paralysis of the right side, including ptosis of the right upper lid, which symptoms have now gradually cleared. She has had a high blood pressure for years.

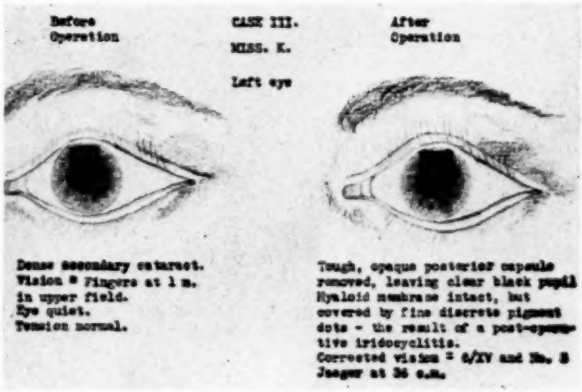


Corrected vision was 6/15 and No. 2 Jaeger at 30 cm. on June 18, 1931.

Corrected vision was 6/6-1 and No. 1 Jaeger at 32 cm. on March 17, 1932.

Case 3. Miss K., aged sixty-five years: Gradual dimness of vision, more marked in the left eye, had been noted. It was moderately improved with

glasses. Diagnosis was cataract, bilateral, incipient, more advanced in the left eye. On February 28, 1928, corrected vision O.D. was 6/6; O.S. 6/9. There had been a recent acute catarrhal conjunctivitis. She was not sure that she had ever seen well with her left eye. She had a Parkinsonian syndrome. On April 18, 1929, a preliminary iridectomy was done; later the left lens was extracted with capsulotomy. Tonsillectomy had been done prior to extraction. Also dental work had been finished. There had been a stormy convalescence from the cataract extraction, apparently associated with previous conjunctivitis. Smears, however, were negative. A dense posterior capsule obstructed all but the superior temporal quadrant. Media, disc and retina were normal. Because of the progressive cloudiness of the right lens it was desirable to improve the vision of the left eye as a reserve. On July 16, 1931, through a keratome incision above the limbus the posterior capsule was incised at the adherent iris margin below, then the dense posterior capsule was delivered by use of a small sharp hook. Black, clear pupil and improved vision was the end result. Hyaloid membrane was intact. The surface showed some fine brown pigment spots. Fine floating opacities were present in the vitreous. No retino-choroidal changes were noted. Vision was 6/15 and No. 3 Jaeger at 30 cm.



1414 Wilshire Medical building.

References

[1] Hardy, W. F. Progress in medical and surgical treatment in ophthalmology. Amer. Jour. Ophth., 1932, v. 15, no. 1, p. 37.
[2] de Schweinitz, G. E. Diseases of the eye. W. B. Saunders, Publishers, 1897, p. 635.
[3] Jackson, Edward. Diseases of the eye. W. B. Saunders, Publishers, 1899, p. 560.
[4] Barkan, Otto. A procedure for the operation of congenital, soft and membranous cataracts. Amer. Jour. Ophth., 1932, v. 15, no. 2, p. 117. Trans. Pacific Coast Oto-Ophth. Soc., May, 1931.

CILIA IN THE ANTERIOR CHAMBER

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The literature is briefly reviewed and a case reported in which three cilia were driven into the anterior chamber through a corneal wound. They were successfully removed through a corneal incision. Read before the Ophthalmological Section of the Baltimore City Medical Society, December 3, 1931.

The transplantation of cilia into the anterior chamber, while not extremely rare, is not of frequent occurrence. In a review of the English literature reports of thirty cases have been found. Sharpe[1] in 1925 found seventy-five such cases had been reported within the last one hundred years. The number of cilia found has ranged from one to fourteen.

In operations where the eyeball is opened, eyelashes may be cut by the instrument in the hands of the operator and thus introduced into the anterior chamber. This method of transplantation is exceedingly rare but a number of authentic cases are on record. The majority of cases have resulted from penetrating injuries in which the penetrating object has not remained in the eye. Occasionally fragments of steel or copper have carried cilia into the vitreous, or fragments have entered the vitreous and left cilia behind in the anterior chamber. It is said that lashes may wander about in the eye and may pass through the iris and gain access to the deeper structures. Smith[2] reported "A case of laceration of the eyeball with an eyelash driven into the lens".

The cilium may be free and movable in the anterior chamber; more often it is fixed by contact with the iris, with the angle of the chamber, or by being embedded in exudate, blood, or opaque lens matter. One end of the cilium may remain fixed in the corneal wound.

Because of their position and function, cilia might be expected, when carried into the anterior chamber, to be a frequent source of infection and to set up severe purulent or plastic inflammation. The contrary, however, appears to be true, since the cilia often remain in the anterior chamber for considerable periods of time without marked reaction. Gradle[3] reported a case where a cilium was found to be depigmented, causing no reaction from its presence in the anterior chamber for nineteen years. Müller, according to Bulson[4], reported a case in which a cilium had remained in the anterior chamber for twenty-four years and Sharpe[1] reported a case of cilia in the anterior chamber for thirty-three years without serious results. However, if the cilium is a carrier of pathogenic microorganisms, it can undoubtedly set up a purulent or a plastic inflammation. Sharpe writes that two cases reported by Hirschberg point to cilia as a source of such infection, for in both instances a circumscribed purulent inflammation cleared up after the removal of the implanted cilia. Two cases of sympathetic inflammation have been reported as resulting from cilia in the anterior chamber, one by Cunier[5] and the other by von Graefe[6].

Cilia after having been present in the eye for a long time without symptoms, may eventually cause complications such as recurrent irritation, mild plastic inflammation and epithelial tumors or cysts. Mild inflammation may occur at intervals as a result of the scratching and pricking of the iris. Rothmund[7] in 1872 collected thirty-six cases of cilia in the anterior chamber with the formation of iris cysts and Sharpe states that in 1871 Rothmund collected thirty-seven cases of cilia in the anterior chamber with epithelial cysts or pearl tumor formation. These formations result from a proliferation of the epithelium of the root sheaths of the eyelashes, and subsequent degeneration with formation of fat and cholesterin globules. These tumors are often attached to, or in contact with, the iris. They may enlarge so as to impinge upon other structures and so cause inflammation, hypertension and visual disturbance, or they may lead to cataract formation or to opacities of the cornea. It has been

shown experimentally that living epithelium transplanted into the anterior chamber may continue to grow and form pearl tumors or cysts.

Cilia remaining for a considerable period in the anterior chamber may undergo some changes in appearance. They may be bleached; the hair may be split; the cuticle may be separated, and the entire cilium may be encysted by a tenacious gelatinous material. It has been stated that through giant-cell formation, cilia may be eventually absorbed.

While cilia may be tolerated in the anterior chamber for years without giving trouble, their removal is always advisable. When their presence is complicated by purulent or plastic inflammation the removal at the earliest possible moment offers a fair chance of checking the inflammation.

Among others who have written on the subject are: Crawford[8], Pike[9], Fox[10], Brown[11], Rockliffe[12], Blake[13], Begle[14], Schultz-Zehden[15], Franklin[16], Williamson[17], Barton[18], Killick[19], Stewart[20], Harlan[21], de Schweinitz[22], Barr[23], and Castroviejo[24].

Case History: W. H., aged thirty-two years, male, negro, first seen August 29, 1931, gave a history of having been struck in the left eye on the previous day, by the end of a piece of wire. Examination showed moderate circumcorneal reaction; pupil irregular due to incarceration of the iris in a penetrating injury of the cornea, situated about 1½ mm. from the limbus down and out; finger tension slightly less than that of the fellow eye; lens clear but in the anterior chamber were seen three slender bodies, the nature of which was not determined by the use of the binocular loupe. On slitlamp examination the bodies in the anterior chamber were recognized as being short, curved hairs, approximately the length and thickness of other cilia of the patient, lying nearly horizontal in the anterior chamber. One end of one cilia had passed through the pupil and was posterior to the iris on the nasal side. No lash ends were seen to protrude from the corneal wound. On the cilia and also on the iris were small patches of exudate. Examination of the lid margins showed a point at the junction of the middle and outer thirds of the lower lid to be devoid of cilia.

An attempt to free the iris from the corneal wound by the instillation of one-fourth percent eserine was unsuccessful. After two days of treatment the exudate in the anterior chamber had become absorbed and there was little circumcorneal reaction. Under local anaesthesia a short incision was made in the cornea about 2½ mm. from the limbus below, through which the iris immediately prolapsed. Excision of the prolapsed iris was left until later to avoid, if possible, losing sight of the cilia by a probable hemorrhage into the anterior chamber. A small toothless forcep was used in grasping the cilia, it being necessary to introduce it twice into the anterior chamber. The lens remained clear and recovery was uneventful. The patient was last seen November 30, 1931, at which time vision with the injured eye was 20/30– and was not improved with a glass.

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Bibliography

[1] Sharpe, O. A. Amer. Jour. Ophth., 1925, Apr., v. 8, p. 301.
[2] Smith, J. R. Ophth. Rec., 1917, v. 26, p. 623.
[3] Gradle, H. S. Amer. Jour. Ophth., 1923, v. 6, p. 764.
[4] Bulson, A. E., Jr. Amer. Jour. Ophth., 1920, Feb., v. 3, p. 128.
[5] Cunier, F. Ann. d'Ocul., 1841, July, v. 5, p. 163.
[6] Von Graefe, A. Arch. f. Ophth., v. 10; No. 1, p. 213.
[7] Rothmund, A. Klin. Monatsbl. f. Augenh., 1872, v. 10, p. 189.
[8] Crawford, R. Lancet, 1883, May, v. 1, p. 819.
[9] Pike, J. B. Lancet, 1909, Dec., v. 2, p. 1668.
[10] Fox, L. W. Amer. Jour. Ophth., 1928, Apr., v. 2, p. 297.
[11] Brown, R. G. Brit. Jour. Ophth., 1919, Apr., v. 3, p. 162.
[12] Rockliffe. Brit. Med. Jour., 1883, Jan., v. 1, p. 113.
[13] Blake, E. M. Arch. of Ophth., 1919, May, v. 48, p. 526.
[14] Begle, H. L. Arch. of Ophth., 1917, Jan., v. 46, p. 47.

[15] Schultz-Zehden. Amer. Jour. Ophth., 1910, v. 27, p. 186.
[16] Franklin, W. S., and Cordes, F. C. Amer. Jour. Ophth., 1925, Apr., v. 8, p. 306.
[17] Williamson. Lancet, 1882, Sept., v. 2, p. 488.
[18] Barton, M. H. Trans. Soc. U. K., 1923, Apr., v. 43, p. 642.
[19] Killick, C. Trans. Soc. U. K., 1923, Apr., v. 43, p. 670.
[20] Stewart, W. E. J.A.M.A., 1924, July, v. 83, p. 193.
[21] Harlan, G. C. Wills Eye Hosp. Rep., 1895, Jan., v. 1, p. 19.
[22] de Schweinitz, G. E. Philadelphia Hosp. Rep. of 1908, 1909, v. 7, p. 11-13.
[23] Barr, W. A. Jour. Ophth. and Oto-Laryn., 1909, Sept., v. 3, p. 352.
[24] Castroviejo, R. Amer. Jour. Ophth., 1931, June, v. 14, p. 538.

OSTEITIS DEFORMANS WITH OPTIC NERVE ATROPHY

Case report

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The literature is reviewed and a case described in which diagnosis was made from x-rays.

Osteitis deformans, also known as Paget's[1] disease, is a general disease of the skeleton, probably due to a constitutional state, the chief manifestations of which are bony enlargement and subsequent deformity. The tendency of the disease is toward a gradual involvement of the entire skeleton. The cause is yet to be discovered. The course varies, sometimes a single bone being involved for a long time before any further advancement. Moore[2] states that blindness from compression of the optic nerve in its canal has been observed frequently, although he does not quote his authority for this statement and very few cases in the literature have been unearthed.

Altogether, according to Goldstein[3], about four hundred cases of osteitis deformans had been reported in the literature up to 1926. Marie Pierre and Leri[4] lay particular stress on characteristic changes in the shape of the skull which is triangular, with the base above. The forehead and the temporal bones protrude much as they do in rickets. The base shows extreme changes. The fontanels are closed. The whole skull tends to bulge as in hydrocephalus. These signs may fail in mild cases, especially the bulging of the posterior vaults against the inner wall, which Marie and Leri characterize as typical of Paget's disease.

Naito[5] divides hyperostoses of the skull into generalized and local. Under general, he places Paget's disease and acromegaly. Local is divided into osteomata, osteosarcomata and hyperostoses. Bony deformity of the orbit should not be classified as Paget's disease as the latter shows characteristic changes in the cranial vault, deformity of the base, and other variations. The facial bones are never involved.

Wyllie[6] reports two cases of osteitis deformans in each of which both optic nerves showed a partial optic nerve atrophy, slowly progressive, with a reduction of vision to 10/200.

Pincherle[7] observed a case in which there was paralysis of the sixth nerve with occlusion of the left sphenoidal fissure and narrowing of the optic canal and optic nerve atrophy.

The case seen by Aebli[8], was of a man sixty-eight years old, with marked unilateral exophthalmos of sudden onset, involving the right eye. Edema of lids and conjunctiva with complete loss of motility, vision limited to hand motion, atrophic nerve, engorgement of the veins and contraction of the arteries were present. The left disc was pale, vision 20/200, with concentric contraction of the field. Hearing was impaired. The entire sphenoidal bone was sclerosed and thickened. Both optic canals were triangular and con-

stricted, the right more so than the left. There had been gradual enlargement of the skull and a six-inch decrease of stature. X-ray showed bone changes characteristic of Paget's disease.

Van Eeden's[9] patient was sound physically up to the age of forty-two years at which time she began to grow dizzy, with frequent headaches. At fifty-five her vision was poor in both eyes. There were pale discs, large and tortuous veins, and slight swelling of the left disc. These changes later disappeared leaving a normal fundus. The skull roof was thickened to the width of the thumb, especially posteriorly, where it was three times the normal. The sella was flat.

Glaessner[10] saw a case of inactive atrophy which he assumed to be the result of a passing compression of the medulla. Cases of osteitis deformans where the skull alone is involved seem to be very rare.

Grosz[11] reported two cases in which the skull alone was involved and collected a total of only seven cases in the literature. In his first case there were dizziness, nystagmus on extreme rotation to one side, lessened corneal reflex of the left eye and questionable paralysis of the internus. In the second case there were headache, slight dizziness, difficulty in swallowing and diplopia. Here we find the symptoms which Schüller has described as typical symptoms of affection of the cranial nerves, due to pressure in the posterior fossa; dizziness and cerebellar gait in the first case and in the second the medulla sign, namely difficulty in swallowing. There is a case reported by Beauvieux of Paget's disease with impairment of vision.

Case report. Mr. D., a superintendent of a steel mill, aged 65 years, married, came to the office stating that two years ago he began to notice some dimness of vision, more marked in the left eye. New glasses were obtained but no benefit derived from them. He had had four new pairs of glasses in the past one and one-half years, each time correcting to 20/20 and J.6 until this last lowering of vision when lenses gave only 20/40 and 20/200. Hearing began to decrease in the right ear at about the same time (the hearing with the left ear had been very poor for twenty years). He began to suffer from occipital headaches which were at times very severe and began to notice some dizziness on arising in the morning, but this would disappear as the day wore on. About one year ago the wife of the patient began to notice that the patient failed to pay attention to things which had personally interested him. His memory has been noticed to have become a little bit poor, although the patient thought that the memory "defect" was more a lack of attention. The patient formerly had retired at about ten or eleven o'clock but got so he would retire very early in the evening and seemed somewhat sleepy at a much earlier hour, and yawned rather frequently. Little or no yawning, occurred in the daytime, however.

The above-mentioned symptoms have grown progressively worse since the onset, with the exception of the headaches which are much less frequent, and the dizzy spells which have practically disappeared.

There has been no nausea or vomiting except a slight occasional attack which accompanied the "bilious spells."

The patient stated that he had an operation on his left ear some twenty years ago and that he had been having trouble with both ears for years. There was a history of deafness in the family.

He had been well until onset of the present illness, never having been sick in his life and not remembering having any of the ordinary childhood diseases.

Physical findings. Head: dolichocephalic, measures 57 cm. in greatest circumference. No bony protuberances or depressions. Cerebral lobes: questionable personality change and memory defect suggest frontal lobe lesion. There is nothing to suggest localization to any other cerebral lobe.

Ears: chronic catarrhal deafness right and chronic purulent otitis left. Examination of right ear shows canal dry, drum very thick and retracted, cone of light badly dispersed. There are

a few fine calcareous deposits in the anterior inferior quadrant. Left ear shows a rather heavy purulent secretion covering drum, through which can be seen a posterior quadrant perforation quite near the margin. The drum is very thick and there are some tiny granulations in the lower border of this perforation and through the perforation one can see granulations in the middle ear cavity itself.

cavation of the disc with the vessels turning over the edge. They do not curl under, but the excavation comes clear to the edge of the disc. There is one arterio-venous junction where the artery kinks the vein. The arteries have some copper streaking. There are no changes in the macula or the retina anywhere. O.S.—here also the excavation is quite deep. There is no bending-under of the arteries. There is no dis-

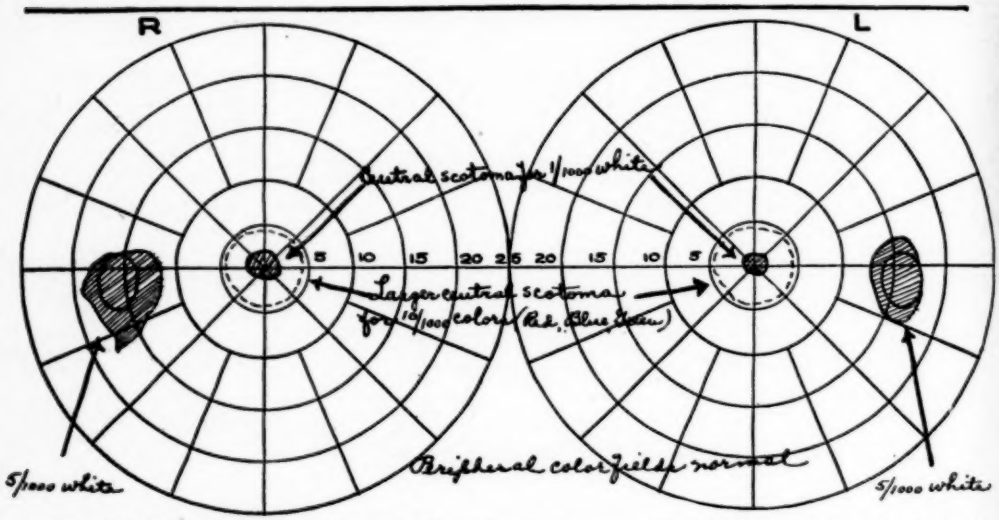

Fig. 1 (Kuhn). Bjerrum screen fields showing scotomata. (Peripheral fields showed very slight general contraction).

Nose: septum in midline, no evidence of any infection.

Teeth: removed recently.

Tonsils: small, full of crypts, scarred, moderate amount of infection in each.

Eyes: vision—on April 10, 1931, equalled O.D., 20/200; improved with +2.00 D.sph. ⊂⊃ + .25 cyl. ax. 150° to 20/20; equalled O.S., 20/200; improved with +2.00 D.sph. ⊂⊃ +.50 cyl. ax. 180° to 20/20. Vision on April 5, 1932, equalled O.D., 20/200; improved with +2.00 D.sph. ⊂⊃ + .50 cyl. ax. 150° to 20/40; equalled O.S., 20/200; improved with +2.00 D.sph. ⊂⊃ +.50 cyl. ax. 180° to 20/200. No letters could be read on the near-vision card.

Tension normal, external appearance normal, pupils react to light and accommodation.

Fundus examination: with electric Gullstrand O.D. shows a very large extinct pallor to the disc. Vessel condition similar to that in O.D.

Fields: no peripheral contraction; small bilateral central scotoma. Blind spot slightly enlarged, left more so than right.

Slitlamp examination was essentially negative.

General neurological: No facial weakness; no 5th nerve involvement; reflexes of upper extremities equal, abdominals not very active; knee kicks and ankle jerks equal and active.

Blood pressure was 110/70.

Laboratory tests: urinalysis, negative; R.B.C. 3,250,000; W.B.C. 7800; Hgb. 80%. Differential: bas. 0, eos. 5%, Myel. 0, Juv. 0, rodnuclears, 1%. Seg. 38%. Lym. 56%. Mono. 0. Blood Wassermann and Kahn, neg. Spinal Fluid Wassermann, neg. P.S.P. 40 and 20% = 60%.

X-ray report (Dr. Roland Klemme): Lateral stereoscopic films of skull, left side to film. Both tables throughout the calvarium show marked thickening with extensive rarefaction, with dark areas alternating with small zones of increased density. A rather large rounded area of increased density is seen just below the inner table, slightly posterior to the coronal suture, in the parietal region. It is about 2½ cm. in diameter. There is great density along the base of the skull. The appearance is highly suggestive of an osteitis deformans.

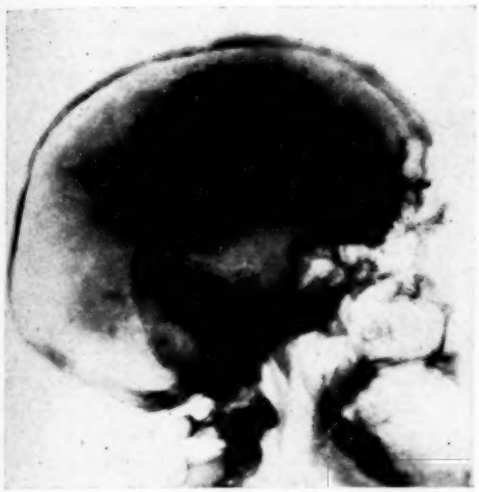

Fig. 2 (Kuhn). Lateral view of x-ray of skull.

X-rays of optic foramen and x-rays of ant.-post. view of pelvis and both hip joints show no evidence of any bone changes.

Conclusion

Lowering of vision over several years without headache or other complaint would hardly call for extensive x-ray examinations and yet no possible diagnosis could have been established in the above-reported rare clinical entity if these plates had not been taken. It is only in this way that these unusual and obscure relationships of pressure and skull and optic nerve disease can be discovered and studied.

First Trust building.

References

[1] Paget, J. Med. Chir., London, 1877, v. 40, p. 37.
[2] Moore, S. Ann. Otol. Rhin. and Laryng., 1927, Sept., v. 36, pp. 662-668.
[3] Goldstein, H. J. Med. Times, 1922, Nov., v. 50, p. 279; 1922, Dec., v. 50, p. 321; 1924, March, v. 52, p. 56; 1926, Aug., v. 54, p. 194.
[4] Marie, Pierre und Leri, A. Handb. der Neurol., 1913, v. 4, pp. 471-493.
[5] Naito. Die Hyperostosen des Schädels, Vienna, J. Safar, 1924. Referred to by Knapp, A., in discussion; Trans. Sect. Ophth. Amer. Med. Assoc., 1930, p. 301.
[6] Wyllie, W. G. Proc. Roy. Soc. Med. (Sec. Ophth.), 1923-1924, v. 17, p. 45.
[7] Pincherle, P. Zentralbl. f. Ophth., 1927, v. 18, p. 870.
[8] Aebli, R. Arch. of Ophth., 1930, Nov., v. 4, pp. 691-694.
[9] Von Eeden, J. H. Jahrb. f. Psychiat. u. Neurol., 1929, v. 46-47, pp. 53-65.
[10] Glaessner, Karl. Wien. klin. Wchnschr., 1908, v. 21, pp. 1327-1332.
[11] Grosz, Karl. Zeit. f. d. ges. Neurol. u. Psychiat., 1921, v. 73, pp. 464-474.

THE DIAGNOSIS OF TRACHOMA

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This article does not lend itself to abstracting, as the substance of it is a comprehensive review of the entire subject. In discussing the difficulties in making an early diagnosis of trachoma, the author states that the slitlamp has been the means of advancing the date of earliest, correct, differential diagnosis and that pannus indisputably belongs in the picture of true trachoma. Presented in part at the Academy of Ophthalmology and Oto-Laryngology in Montreal, Canada, September 21, 1932, under the title, "Recent developments in trachoma investigations." From the Department of Ophthalmology, Washington University, St. Louis, Missouri.

It has frequently been said that the problem of attempting to determine the etiology of trachoma has been made exceedingly difficult by the confusion regarding the clinical picture. On the one hand the laboratory worker has wanted the clinician to tell him definitely what cases were trachomatous and what were not; on the other hand the clinician has desired the laboratory man first to furnish him the specific criteria for making a differential diagnosis. An analysis of our knowledge up to the present time, and particularly a study of the recent literature, should be worth while in helping us to determine just where we stand in the matter. It seems best to endeavor to clarify first the clinical picture of trachoma.

I. Clinical Aspects

The earliest manifestations of the disease have been studied recently with great care by a number of workers in both experimental and clinical cases. The biomicroscope has added greatly to the facility and thoroughness of these observations. In fact, this instrument is now considered of more value than the microscope in making a diagnosis, particularly in the early stage, which is the one that gives us the most trouble.

The earliest visible changes occur in in the network of vessels in the upper tarsal conjunctiva. The larger vessels are congested, in consequence of which the delicate capillaries become so highly developed and swollen that the surface of the conjunctiva appears studded with numerous tiny red dots or punctations, here and there interspersed with whitish circular areas larger than the punctations. Wilson[1] refers to these first changes as the proto-trachomatous stage of trachoma, a stage preceding Trachoma I of MacCallan.[2] Under the high magnification of the biomicroscope each red punctation is seen to be a veritable bouquet of capillaries situated just beneath the epithelium (Cuénod and Nataf[3]).

The pale circular spaces which, by the way, are considered the first manifestation of the trachomatous follicles, are generally located between bifurcations of blood vessels and are also more or less encircled by smaller vessels. To the naked eye these embryonic follicles appear first as tiny, yellowish-white points on the tarsal conjunctiva as was pointed out by a British colleague of mine in China, Dr. E. J. Stuckey[4], who for two years during the war was ophthalmologist and medical officer in charge of Chinese labor battalions in France. Stuckey contended that these points are absolutely diagnostic of beginning trachoma. But Cuénod and Nataf think that the changes that follow definitely establish the diagnosis.

Due to a loss in the normal transparency of the conjunctiva most of the larger vessels as well as the delicate capillaries soon become no longer visible. With the slitlamp the capillaries are seen to have been replaced by a marquetry of polygonal bright-red plaques or mosaics which are separated by clear linear spaces. The red stippling is caused by the presence of a terminal capillary tuft or bouquet in each plaque. The plaques represent the beginning of trachomatous papillae. The individual papillae steadily hypertrophy, push outward and eventually become closely packed together. On account of the lateral pressure of the

papillae upon each other and the increasing dominance of the hemispheric opalescent nodules or follicles which separate the plaques here and there, the papillae generally remain very fine, often invisible to the naked eye. But they are unmistakably clear with the biomicroscope, and also in microscopic sections. The papillae give to the tarsus a velvety appearance even in the presence of the follicles, which are more in evidence at the upper tarsal border.

Synchronously with the changes occurring in the tarsal conjunctiva, the bulbar and the retrotarsal conjunctiva become more and more congested and somewhat edematous. In the retrotarsal area and the fornix the conjunctiva becomes so redundant that it is thrown into horizontal folds in which follicles soon appear. At this stage there usually is a watery-mucoid discharge. In acute cases the discharge is muco-purulent.

As the disease progresses from Trachoma I to Trachoma II according to MacCallan's classification, the follicles in the retrotarsal conjunctiva become larger and more translucent, and frequently rupture spontaneously, a phenomenon which is characteristic only of trachoma (Wilson[1]). The bulbar conjunctiva becomes more and more hyperemic. But most important is the subepithelial infiltration which involves the entire conjunctiva and gives it a cloudy, lusterless appearance. Follicles also appear in the bulbar conjunctiva, especially in those areas adjacent to the upper and lower fornices, in the semilunar fold, and at the limbus. Later the caruncle itself is often studded with follicles around its base. According to Pascheff[5] the follicles in both the palpebral and bulbar conjunctiva tend to become confluent. To this confluent, follicular hyperplasia he has given the name "folliculoma".

Along with the formation of follicles in the retrotarsal conjunctiva there also occurs the development of papillary hypertrophy (MacCallan's Trachoma IIb) as was described in the tarsal conjunctiva. But the proportion of papillae to follicles varies greatly in different cases, so much so that we have been taught to speak of follicular trachoma if the follicles greatly predominate, of papillary trachoma if the papillae predominate, and of a "mixed type" if the two forms are both clearly interspersed in the conjunctiva. During these stages (IIa and IIb) when the symptoms are generally less acute than they are in the initial stage, the discharge is mucoid and sticky and produces a dried, yellowish film on the margins of the lids (Wilson[1]). It is quite generally agreed that this is the most infective period of the disease.

The formation of scar tissue is the next important phenomenon in trachoma. Cicatrization may actually appear in the initial stage or it may not appear until a later stage (Trachoma III). Trachoma is a self-limiting disease only because of the transformation of some of the subepithelial structures into connective tissue. In some cases this occurs early and quickly; in others more slowly, eventually becoming complete (Trachoma IV) if the individual lives long enough. Braun[6] states that trachoma may heal spontaneously at any stage, but rarely without conjunctival scarring.

In their biomicroscopic studies, Cuénod and Nataf[3] found as the first evidence of scar tissue a white horizontal streak across the tarsus devoid of follicles and papillae. This has long been known as the cicatricial line or zone of Arlt[7], due to its first having been demonstrated by that ophthalmologist. It should be mentioned that this corresponds to the zone where the capillaries of the ascending and descending perforating vessels of the tarsus meet and anastomose. There next appear tiny irregularly star-shaped cicatrices in the tarsus connected by fine, cicatricial lines or prolongations from the stars, each of which occupies the former site of a follicle. The follicles had previously either ruptured spontaneously and the cellular elements evacuated, or the cellular elements have become necrotic and partially absorbed. In either case the follicles are replaced by connective-tissue fibers which have already invaded the follicles in an earlier stage.

Between the cicatricial areas of the

tarsal conjunctiva there persist for some time granular islets which, however, gradually diminish in size and number as the scar-tissue formation increases. These islets are made up chiefly of dark-red, vascularized papillae with here and there a degenerating follicle. In the final stage the granular islets have entirely disappeared, the surface of the conjunctiva is quite smooth and whiter than normal and also devoid of vessels except for an occasional capillary.

The same cicatricial changes, preceded by evacuation or degeneration of follicles, occur in the conjunctiva of the fornix but on account of the looser structure of the tissue and the better blood supply, the formation of connective tissue is not so apparent.

In serious cases the cicatricial changes in the conjunctiva of both upper and lower lids may be very dense and result in serious distortion of the lids, the upper generally being the more seriously affected, with such complications as trichiasis, entropion, and symblepharon (Trachoma IV). Wilson[1] thinks that fine scarring of the conjunctiva is in itself not pathognomonic of trachoma, for similar changes are seen following severe, acute, purulent ophthalmias. Fine scar tissue has frequently been reported following inclusion blennorrhea. Fuchs[8] states that one often finds scar tissue in the conjunctiva after recovery from a severe gonorrheal conjunctivitis. However, Cuénod and Nataf[3] declare that the tiny star-shaped cicatrices which may be seen with the biomicroscope in the tarsus some time before they become visible to the naked eye are absolutely pathognomonic of trachoma. With regard to the significance of extensive scar-tissue formation there has never been any question. To establish the earliest criteria of diagnosis is our object here.

It is especially gratifying that regarding the question of pannus those most familiar with trachoma are now in almost universal accord. The corneal changes in trachoma are no longer looked upon as due to mechanical irritation but as an essential part of the disease. Here again the biomicroscope is of great value in making examinations.

The investigations of Vogt[9], Gallemaerts[10] and others with the slitlamp have established the existence in normal eyes of a transitional zone at the limbus containing (1) a highly developed lymphatic network with radial striae which are pigmented, palisaded and anastomosed, and (2) a network of capillaries which appear surrounded by a double-walled lymphatic sheath and which generally anastomose. Occasionally one observes in normal eyes a tiny capillary penetrating a bit beyond the palisaded zone of the limbus into the transparent cornea, but such an isolated adventurous capillary is an exception and is in no sense analogous to the pannus of trachoma which consists of superficial, new, vascular formation associated with subepithelial infiltration.

Cuénod and Nataf[11] have demonstrated that, at quite an early hour in the initial stage of trachoma, the first indications of pannus occur at the limbus of the upper corneal segment. Even before there is any involvement of the cornea visible to the naked eye, the biomicroscope reveals a number of tiny capillaries that have adventured beyond the limbal zone into the transparent cornea. The high magnification also shows a fine infiltration not only between and around the capillaries but also in advance of them. That is, the lymph-cellular elements precede the capillaries, seeming to form for them jackets into which the capillaries enter and grow. Morax[12] is one of several others who also believe that the capillaries follow the cellular infiltration.

In addition to Cuénod and Nataf, numerous investigators now aided by the slitlamp are firmly convinced that pannus begins in the earliest stage of trachoma, probably even synchronously with the first signs in the palpebral conjunctiva. Wilson[1], referring to trachoma in Egypt, declares that sooner or later all cases show the formation of new vessels in the cornea. In fact, he has never seen a case that did not. His statement quite confirms the

opinion that I have maintained for years—an opinion based upon observations of trachoma in four continents: If a case does not show pannus within four to eight weeks, then it will never show any and is not a case of trachoma. I have never seen that principle fail.

There seems to be no definite relationship between the severity of the conjunctival involvement and that of the cornea. The conjunctiva may be markedly affected and the pannus be comparatively slight, or the conjunctiva may be only moderately involved and the corneal changes extensive. I recall two cases which were shown to me in Peking by my Chinese colleague and assistant, Doctor H. T. Pi, in which there were no conjunctival symptoms at all, but in which pannus was visible with oblique illumination. We admittedly were puzzled and decided to watch the cases without giving treatment. We were able to follow one of them long enough to see the conjunctiva become definitely affected with trachoma. Based upon the consensus of opinion, pannus is therefore recognized as absolutely pathognomonic of trachoma and always appears either synchronously with, or during a period of not more than two months from the onset of the initial signs in the conjunctiva.

During the development of pannus in the cornea, cellular changes are occurring at the limbus leading to the formation of follicles. Later on these follicles may rupture and cicatrize to form ocelles (Bonnet[13]) or the marginal pits of Herbert (MacCallan[14]). The presence of these pits is considered a definite pathognomonic sign of trachoma. However the formation of follicles does not end at the limbus, but actually extends into the cornea (Pascheff[15], Hiwatari[16], Meyerhof[17]) where small rudimentary follicles or cellular concentrations appear, usually situated at the bifurcation of a large capillary. Pascheff calls these corneal concentrations true trachomatous follicles since their contents are identical with the elements of a trachomatous follicle of the conjunctiva. A number of these punctations may often be seen with the naked eye, generally just in advance of the terminal capillaries. Moretti[18] mentions small, gray, superficial dots in the cornea between the loops of vessels and at the ends of the vessels. In describing the corneal involvement in trachoma the writer[19] stated several years ago that along with beginning pannus "tiny infiltrations are formed beneath the corneal epithelium which may be referred to as a superficial punctate keratitis".

Superficial erosions of the cornea frequently occur. These generally appear as tiny ulcers where the follicles or superficial punctate infiltrations have emptied. The ulcers almost always heal quickly but leave permanent facets in the cornea. The facets in the cornea are the homologues of the star-shaped cicatrices in the tarsal conjunctiva (Cuénod and Nataf[3]).

As the disease progresses the vascularization and infiltration of the cornea followed by connective-tissue formation increase. Whereas in the beginning only the superficial layers of the cornea are involved, eventually the process may extend deeper than the middle layers of the cornea. The corneal condition, instead of being a pannus tenuis, finally becomes a pannus crassus.

II. Histopathological Aspects of Trachoma

More work has probably been done on the histopathology of trachoma than on any other phase of the disease. But even here our knowledge is not static, as is evidenced by the recent contributions of several investigators.

It is very generally accepted that associated with congestion of the blood vessels in the palpebral and bulbar conjunctiva there always occurs a pronounced subepithelial infiltration of lymphocytes in the very beginning of trachoma (Kunz[20]). Also that its lymphocytic character changes more and more into an infiltration of plasma cells (Birch-Hirschfeld[21]), which likewise are present in the initial stage but which apparently develop more slowly than the lymphocytes. Plasma cells proliferate chiefly along the blood vessels, pos-

sibly because they are the offspring of the vascular adventitia. However, Maximow[22] contends that they originate from small- and medium-sized lymphocytes. The fundamental constituents of the papillae in trachoma are plasma cells, while the follicles possess typical germinative centers composed of monocytes, chiefly endothelioid cells, surrounded by a zone of lymphocytes. As the disease progresses plasma cells infiltrate the deeper tissues, especially the tarsus, where, in later stages, they may be found occupying the sites of deteriorated meibomian and Krause's glands. Evidence of a general tarsitis is considered by some authorities as a definite diagnostic sign of trachoma. Ichikawa[23] maintains that in evaluating animal experiments, particular attention should be paid to the histologic changes in the bulbar conjunctiva, inasmuch as he considers the appearance of subepithelial infiltration of the bulbar conjunctiva which is rich in plasma cells, the only pathognomonic symptom of trachoma.

In occasional cases of trachoma, the proliferation of plasma cells is so strong that they even replace the lymphocytes of the follicles, or they themselves may produce follicles *de novo*. This probably corresponds to what Pascheff[16] has called plasmacellular conjunctivitis. Sometimes the follicles continue to enlarge and coalesce to form tumorlike structures which are known as plasmoma. These tumor masses as well as the more generalized plasma-cell infiltrations may undergo hyaline and amyloid changes. Recent authors including Soudakoff[24], Pascheff[16], and Papolczy[25], on the subject of plasmoma are inclined to the hypothesis that all plasmomas are trachomatous in origin on the basis that in nearly all of their cases there was also trachoma. James[26] recently reported a case of plasmoma from our clinic in which there was an associated trachoma. I have seen ten cases of plasmoma and although the majority of them had definite signs of trachoma, I cannot subscribe to the above hypothesis, first, because the disease is too rare and trachoma too common to postulate such a relationship; second, because in two of my worst cases there was no evidence of trachoma although the tumor in lobulated straw-colored masses involved the fornices, the entire bulbar conjunctiva, and in pendulous fashion partly covered the cornea and protruded from the lids; third, because of the histologic finding in one trachoma-free case of a calcified cyst which may have been the degenerated remains of an animal parasite of some kind. I should like to suggest, therefore, the use of the terms "primary plasmoma" when no complicating disease of the conjunctiva is evident, and "secondary plasmoma" when associated with such a disease as trachoma.

Associated with the formation of papillae packed with plasma cells there is also an increase in the number of layers of epithelial cells. At the same time, due to the pushing out of the papillae with their terminal capillary buds, there is an apparent downgrowth of epithelium between the papillae. According to Wilson[1] these epithelial crypts frequently become blocked off and then one sees under the miscroscope epithelial pseudocysts filled with leucocytes and epithelial debris, which later degenerate with the formation of calcareous deposits. In the same way retention cysts in Krause's and the meibomian glands are formed.

According to v. Hippel[27] pannus is formed either in front of or behind Bowman's membrane, but the primary development of the corneal vessels on its posterior surface is the more frequent. Later this membrane becomes filled with perforations, giving it a moth-eaten appearance, and finally may disappear entirely.

The cause of scar-tissue formation in trachoma has puzzled pathologists for many years. Its visible presence in the conjunctiva has long been considered one of the diagnostic signs of the disease. There have been many theories regarding the causes of its formation, but none has been proved thus far. I believe that Peters[28] in his latest work has advanced our knowledge on the subject somewhat. He has long advocated that the trachomatous changes in

the conjunctiva consist in a deposit of lymphoid tissue which possesses a pronounced tendency to cicatrize and shrink.

Following a paper by Rössle and Yoshida[29] on the finding of a reticular tissue of lattice fibers in lymph glands both in normal and pathological conditions and the subsequent finding of similar fibers in numerous organs by other investigators, Peters demonstrated their presence both in acute and chronic trachoma. He also recognized a transition of these fibers in some places into collagenous fibers. From this he concludes that lattice fibers are a prestage of collagenous fibers. In the chronic cases he found a strong network of lattice fibers in the region of the upper retrotarsal fold. He found them especially numerous around the follicles but much less frequently within the follicle itself. Most important of all he found them matted between the follicles and the epithelium as an additional layer. Preparations of sections from a typical cicatricial case of trachoma showed the lattice fibers no longer recognizable, and the whole tarsal structure, very poor in cells, consisted of collagenous fibers. Peters concludes, therefore, that the lattice fibers in the conjunctiva may at least introduce the process of cicatrization, in the same way that they do in sclerotic processes of the lymph glands and in the liver. If Peters be correct it now remains to determine why the virus of trachoma has such a specific or selective action upon the lattice fibers, and also what happens to the lattice fibers in other diseases of the conjunctiva. This work has the promise of opening the way for a new method of differential diagnosis.

Two Russian investigators, Dwijkoff and Lewkoewa[30], recently reported that they had demonstrated the presence of specific cells in trachomatous tissue by the application of certain pathological procedures and staining methods. However, Lamb, working in our laboratory, was unable to verify their findings.

There is no indisputable evidence that specific blood changes occur in trachomatous cases. Comparing the results of examinations of infected and of noninfected persons living in the same district, Marcus and Weiner[31] found no essential difference in the hemoglobin, erythrocytes, leucocytes, neutrophiles, eosinophiles and lymphocytes. A few authors think that their examinations have shown a moderate lymphocytosis but due to lack of a sufficient number of proper controls their conclusions are open to criticism.

Reference to the position of epithelial-cell inclusion bodies should not be omitted here because there are still many authorities who believe that their presence in specimens is of great diagnostic value.

A study of the literature shows that inclusions have never been found in cases of folliculosis, but that positive findings in trachoma range from fifty to practically one hundred percent varying with the different workers and the types of cases examined. In a series of 164 cases of initial trachoma having acute or subacute symptoms Taborisky[32] found inclusions in 163. In his serial studies which included cases of initial trachoma, suspicious trachoma, chronic trachoma, both with and without scar-tissue formation, he found the Prowazek-Halberstaedter bodies in 67.3 percent. In the eye clinic at the Rockefeller Hospital in Peking my assistants and I found inclusions in sixty-five percent of consecutive cases which included all stages of the disease. Approximately half of the cases showed inclusions on the first examination, the additional fifteen percent of positives being found in material secured on the second or third subsequent visits. We also demonstrated, as did Taborisky and others, that inclusion bodies can be found in almost one hundred percent of cases in the initial stage. This is significant in view of the occasional difficulty in making an early diagnosis from the clinical signs. It is important too that inclusion bodies are found most plentifully in conjunctival areas which are most inflamed and in cases in which the process is the most acute.

The significance of epithelial-cell inclusions in trachoma is, however,

greatly lessened by the finding of morphologically similar bodies in inclusion blennorrhea, swimming-bath conjunctivitis, vernal catarrh, Samoan conjunctivitis (epitheliosis desquamativa) and hog cholera; also in cells from the genital tracts of adults with inclusion blennorrhea or of parents whose newborn children have the affection. Hence it is impossible to believe that such inclusions are specific for trachoma alone.

III. The Follicle and its Significance

As one reads the recent literature he is impressed by the overwhelming belief in the dualistic as against the unitarian theory of trachoma. The unitarian theory holds that all follicle-producing affections of the conjunctiva have the same etiology. Perhaps a more consistent term than "unitarian" would be "monistic". For that matter the term "dualistic" does not so adequately express the opinion most generally accepted as does the word "pluralistic" which implies a theory that there are several follicular diseases of the conjunctiva from an etiological standpoint. Blatt[33] considers the unitarian viewpoint, because of the complications of official regulations and measures, to be not only incorrect but dangerous, for if a patient with follicular granulations of the conjunctiva is interned in a trachoma hospital, he may contract real trachoma. He further says that unitarians overlook the fact that folliculosis is a benign condition which heals without scars and corneal involvement, while trachoma is a malign disease, the outstanding characteristics of which are scar formation and pannus.

Judging by the importance given to the conjunctival follicle in experimental trachoma by some recent investigators one would be inclined to believe that they considered the follicle specific of trachoma. It does not seem to be fully realized that the great majority of pathologists are opposed to this view. Pascheff[16] declares that the production of follicles does not mean that trachoma has been reproduced. Taborisky[32] states that it is an error to regard follicles as the *sine qua non* of trachoma diagnosis since trachoma without follicles is not a great rarity even in adults, and often occurs in children. Kunz[20] says that the granule in the conjunctiva is not typical of trachoma, for the structures that develop in follicular catarrh and various chronic irritations do not in themselves show any morphologic deviation from the trachoma follicle which, like follicles of other affections, is only a form of reaction on the part of the conjunctiva to inflammatory irritation. In Birch-Hirschfeld's[21] opinion the follicle is not the essential (specific) factor for the course of the disease in trachoma. Rotth[34] states that the follicle does not signify trachoma, for other irritations induce its appearance. He considers that the fully developed follicle of trachoma differs clinically from other follicles but that in fresh cases there is no difference. Wilson[1] states that from a histological viewpoint there is very little to distinguish the early stages of trachoma from other follicular conditions of the conjunctiva. In trachoma he finds more evidence of a widespread inflammatory reaction resulting in a marked generalized subepithelial infiltration, but he considers "of much greater diagnostic importance the degenerative cicatricial and corneal changes which invariably follow in trachoma but which never occur in follicular conjunctivitis." Ditrói[35], who is a proponent of the dualistic view and of the unconditional specificity of trachoma, considers important from the standpoint of differential diagnosis the coppery-red color and general infiltration of the conjunctiva, and the bursting of follicles often followed by a new formation of follicles.

Morphologically speaking, there are two distinct types of folliculosis, the one consisting of small, pearly looking follicles often arranged more or less in parallel rows on the palpebral conjunctiva; the other characterized by massive, often confluent opalescent follicles generally restricted to the retrotarsal and bulbar conjunctiva but occasionally also involving the conjunctiva of the tarsus. It is this second type of folliculosis with the large soft follicle, particularly when associated with a mild

inflammation, that is often mistaken for trachoma. Lindner[36] and Rieger[37] have adequately described this type, which they consider an infectious process but which never leads to pannus and connective-tissue formation, and tends to heal spontaneously in the course of several months to two or three years without sequelae of any kind. As ophthalmologists we have all seen too many of these cases, often severe and extensive, and generally in children, entirely recover without treatment to believe that they are cases of trachoma.

This question of follicles is important because of its relationship to experimental trachoma in animals. Much has recently been written about spontaneous folliculosis in monkeys. Wilson[38] describes two types that he found in monkeys in the Zoological Gardens in Cairo, the first, consisting of small superficial hard translucent discrete follicles on the conjunctiva and not involving the tarsus; the second, a follicular conjunctivitis with large, soft follicles, translucent and somewhat yellowish, associated with a subepithelial inflammation and a sticky mucoid discharge. He found the tarsal conjunctiva to be free. In early shipments of monkeys to our laboratory from New York we found so many of the animals with spontaneous folliculosis that we finally had to have them sorted before they were shipped either by one of us or by some one whom we could trust. For instance, Weiss examined a shipment of twenty rhesus monkeys at our laboratory on January 2, 1930, and found several with an extensive follicular and papillary hyperplasia involving the caruncle and the conjunctiva of the tarsus as well as the retrotarsal conjunctiva, and associated with a slight muco-purulent discharge and some crusting at the lid margins.

Many other authors report the frequency of spontaneous folliculosis in various species of monkeys and also in other animals. Nicolle and Lumbroso[39] found marked spontaneous granulosis in rabbits and on this account retracted the alleged successful transmission of trachoma to rabbits previously reported by Nicolle[40] and other coworkers.

In view of these follicular complications it is very difficult to evaluate the conjunctival lesions in experimental trachoma in animals, especially in the monkey. Without the association of pannus and scar-tissue, the characteristic signs of human trachoma, it would seem unscientific to attach much importance to the follicle.

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References

[1] Wilson, R. P. Ophthalmia Aegyptiaca. Amer. Jour. Ophth., 1932, v. 15, pp. 397-406.
[2] MacCallan, A. F. Trachoma and its complications in Egypt. Camb. Univ. Press, 1913.
[3] Cuénod, A. and Nataf, Roger. La Trachome. Paris, Masson et Cie, 1930.
[4] Stuckey, E. J. Diagnosis of trachoma. China Med. Jour., 1924, v. 38, pp. 182-184.
[5] Pascheff, C. Chronic hyperplasia of the conjunctiva and true trachoma: Memoires originaux. Arch. d'Opht., 1930, v. 47, pp. 821-832.
[6] Braun (Mlle.). Rapport sur les affections oculaires les plus fréquentes en Algérie et Tunisie. Bull. Soc. d'Opht., 1930, no. 2, pp. 91-104.
[7] Arlt, F. von. Klinische Darstellung der Krankheiten des Auges, Wien, 1881.
[8] Fuchs, E. Textbook of Ophthalmology (Fourth Amer. edit. by A. Duane), New York, Lippincott Co., 1913, p. 140.
[9] Vogt, A. Lehrbuch und Atlas der Spaltlampenmikroskopie des lebenden Auges, Berlin, Julius Springer, 1930.
[10] Gallemaerts. Examen microscopique de la cornée au moyen de la lampe à fente, Paris, Masson et Cie, 1926.
[11] Cuénod, A. and Nataf, R. Biomicroscopie du pannus trachomateux au début. Arch. d'Opht., 1931, v. 48, p. 737.
[12] Morax. Complications cornéennes du trachome. Rev. internat. du Trachome, 1929, v. 6.
[13] Bonnet, P. Les ocelles limbiques et le trachome conjonctival bénin. Bull. Soc. d'Opht. de Paris, 1927.
[14] MacCallan, A. F. Fossettes marginales de Herbert et les rosettes cornéennes du trachome. Arch. d'Opht., 1931, v. 48, p. 138.
[15] Pascheff, C .Researches on the follicular diseases of the conjunctiva. Amer. Jour. Ophth., 1932, v. 15, pp. 690-708.

[16] Hiwatari, K. Quoted by Cuénod and Nataf.
[17] Meyerhof, M. Quoted by Cuénod and Nataf in Le Trachome.
[18] Moretti, E. Clinical research with the slitlamp in trachomatous keratitis. Ann. di ottal. e clin. ocul., 1931, v. 59, p. 527.
[19] Howard, H. J. The eradication of trachoma among school children in China. China Med. Jour., 1924, v. 38, pp. 255-270.
[20] Kunz, E. Die Veränderungen im Frühstadium des Trachoms. Zentralbl. f.d. ges. Ophth., 1930, v. 24, pp. 177-182.
[21] Birch-Hirschfeld, A. Die histologischen Veränderungen in den Spätstadien des Trachoms. Zentralbl. f.d. ges. Ophth., 1930, v. 24, pp. 182-184.
[22] Maximow, A. A. In "Special Cytology" (Edited by E. V. Cowdry), New York, Paul B. Hoeber, 1928, v. 1, pp. 319-367.
[23] Ichikawa, K. Uber die trachomatöse Veränderung der Sklerobindehaut. Arch. f. Ophth., 1911, v. 79, p. 64.
[24] Soudakoff, P. S. Plasmoma of the conjunctiva in China. China Med. Jour., 1930, v. 44, p. 195.
[25] Papolczy, F. V. Newer contributions to the relationship between plasmoma and trachoma. Klin. Monatsbl. f. Augenh., 1931, v. 87, p. 773.
[26] James, W. M. Plasmoma of the conjunctiva. Amer. Jour. Ophth., 1929, v. 12, pp. 731-736.
[27] Hippel, E. v. In Henke and Lubarsch's "Handbuch der speziellen pathologischen Anatomie und Histologie," Berlin, Julius Springer, 1928, v. 11, sect. 1, Auge, pt. 1, p. 204.
[28] Peters, A. The histology of trachoma (lattice fibers). Klin. Monatsbl. f. Augenh., 1932, v. 88, pp. 145-149.
[29] Rössle, R. and Yoshida, T. Das Gitterfasergerüst der Lymphdrüsen unter normalen und pathologischen Verhältnissen. In Ziegler's "Beiträge zur pathologischen Anatomie," 1909, v. 45, pp. 110-126.
[30] Dwijkoff, P. P. and Lewkoewa, E. F. Zytologie der Bindehaut bei Trachom und die Probleme der pathogenese derselben. Ztschr. f. Augenh., 1930, v. 71, p. 312.
[31] Marcus, J. M. and Weiner, K. G. Morphologic blood changes in trachoma. Ukrainskii Oft. Jour., 1929. v. 1,.p. 169. (Abs. by J. I. Gonterman in Zentralbl. f.d. ges. Ophth., 1930, v. 22, p. 628.)
[32] Taborisky, J. The Prowazek-Halberstaedter bodies and their clinical significance. Arch. f. Ophth., 1930, v. 124, pp. 455-485.
[33] Blatt, N. Was soll eigentlich Trachom genannt werden? Ztschr. f. Augenh., 1931, v. 73, p. 262.
[34] Rotth, A. Trachoma discussion. Ztschr. f. Augenh., 1931, v. 73, pp. 301-304.
[35] Ditrói, G. V. Trachoma discussion. Ztschr. f. Augenh., 1931, v. 73, p. 304.
[36] Lindner, K. Ueber die Schwierigkeiten der Trachomforschung. Ztschr. f. Augenh., 1925, v. 57, p. 508.
[37] Rieger, H. Zur Aetiologie der Folliculosis conjunctivae. Arch. f. Ophth., 1932, v. 128, p. 310.
[38] Wilson, R. P. New notes on the problem of the etio-pathology of trachoma. Rev. internat. du Trachome, 1929, v. 6, p. 76.
[39] Nicolle, Charles and Lumbroso, U. Recherches sur les conjonctivites granuleuses naturelles de quelques animaux de laboratoire, en particulier du lapin. Leur importance dans l'étude expérimentale du trachome humain. Arch. de l'Inst. Pasteur de Tunis, 1926, v. 15, p. 240.
[40] Nicolle, Charles and Cuénod, A. Étude expérimentale du trachome (traveaux de recherche). Arch. de l'Inst. Pasteur de l'Afrique du Nord., 1921, v. 1, p. 149.

NOTES, CASES, INSTRUMENTS

USE OF PRISMS IN BILATERAL PTOSIS

Case report

SIDNEY L. OLSHO, M.D.
PHILADELPHIA

In 1913, a girl, aged eight years, in good general health, was brought by her family physician, a close relative, for refraction. She had bilateral ptosis of so high a degree that the head posture was extremely awkward. At aged six years (1911) in another city, she had bilateral ptosis operations.

The upper lids showed abundant scar tissue and lacked depth in the upper folds. The palpebral fissures were low and narrow. The eyes converged excessively with any effort to see. There was no outward rotation of either eye beyond the median line. The eyeballs were in a fixed, depressed position. Slight downward rotation was possible. Futile occipito-frontalis effort to elevate the lids was evident. The ptosis operations had obviously not been a success.

Vision in each eye was 15/70. The pupils were pear shaped, right 3 mm., left 2 mm. Reaction to light was sluggish, in accommodation imperceptible. The media were clear. The eye grounds showed no gross changes. The refractive error at this time was as follows:

O.D. — 1.75 D. sph. ⌯ — 3.50 cyl. ax. 45°; V = 20/70

O.S. — 0.50 D. sph. ⌯ — 3.00 cyl. ax. 180°; V = 20/50

A prism of eight diopters, base up, was incorporated in each lens. Changes in her lenses were made at intervals of from one to two years and the aforementioned prisms were worn from 1913 to 1919. Their purpose was to make it unnecessary to elevate the head so uncomfortably far. The benefit of the prisms was very noticeable.

In January, 1918, her transposed prescription, surfaced as ordered, read as follows:

O.D. — 4.00 D. sph. ⌯ + 2.25 cyl. ax. 90° ⌯ Δ 8 diopter base up

O.S. — 3.25 D. sph. ⌯ + 2.50 cyl. ax 75° ⌯ Δ 8 diopter base up

At the age of thirteen years, January, 1919, she developed an interstitial keratitis. The Wassermann, accepted heretofore from her family physician as negative, was four plus. She received local and internal treatment and neosalvarsan administered by a syphilologist. The corneal opacities were treated for a number of years. In 1919, when aged fourteen years, she was considerably taller, therefore the prisms were reduced to six diopters, base up in each eye. From 1920 to 1922 the prisms ordered were only four degrees, base up in each eye.

Subsequent to the specific treatment her growth was rapid. By 1923, at the age of eighteen, she was so tall, five feet, nine inches, that she looked down into the faces of most people and no prisms base up have been ordered since.

There has been a considerable change in her refraction. The visual record, never very good, January 18, 1932, was as follows:

O.D. without glasses, vision was 20/70 + 1; with — 5.00 D. sph. ⌯ + 8.00 cyl ax. 30°; v = 20/50 +

O.S. without glasses, vision was 20/50 + 1; with — 4.50 D. sph. ⌯ + 8.00 cyl. ax. 165°; v. = 20/30 —

At this time (1932) the patient is a well developed, not unattractive girl of twenty-seven years. She has completed a high school education and has become a teacher of music. One gets a good view of her eyes in ordinary conversation.

Recently several Pennsylvania optometrists have given publicity to a ptosis crutch, and my patient became interested. These devices are not new, and brief references are appended.

A gold wire is soldered to the rim of a spectacle frame. The wire is first carried inward and then is so adjusted that a curved portion (ca. ¾ in.) lies in the fold of the upper eyelid and gently raises it. In my patient the "crutches"

proved unsatisfactory for the following reasons:

1. They made an uncomfortable pressure in the shallow, tender, upper lid folds.

2. They gave the eyes a staring appearance because the lids were elevated but the eyes remained depressed.

3. The patient became unable to wink her eyes, but went through a number of contortions as this impulse became irresistible.

Comments

1. The ptosis crutch might be useful when a patient desires a photograph.

2. It may be indicated in certain artificial eye cases and in some plastic cases.

3. A ptosis crutch may interfere with normal nictitation and expose a healthy cornea to damage by air and foreign bodies.

During efforts to close the lids or at any time, the wires may break and their ends damage the eyeball.

5. I question the propriety of optometrists entering this field of endeavor. The crutch may be prescribed in some cases without reference to the probable underlying causes of ptosis or to the possibility of cure by medicine or by the newer surgical technic.

The features of this case are:

1. Unsuccessful ptosis operations at the age of six years—ophthalmoplegia.

2. The incorporation of high prisms, bases up, in the refraction correction during childhood.

3. Tall stature acquired in adolescence gradually obviating the necessity of the prisms.

4. Interstitial keratitis at age of thirteen.

5. At age of twenty-seven, ptosis crutches tried and rejected.

References to ptosis crutches

W. Goldzieher (Centralbl. f. prak. Augenh., 1890, p. 34), used as a ptosis crutch a shell plate attached to a shell spectacle frame.

F. Kauffman (id. 1893, March) used an adjustable stem resembling that of a watch, which was secured to the spectacle rim and made pressure upward and outward near the site of the lachrymal gland.

A. Meyer (Archiv. f. Augenh. 1893, v. 26, No. 2, p. 153) described a wire ptosis crutch, which was independent of spectacles. It had two arms and permitted lid closure. The adjustment was delicate and easily disarranged but he had himself worn one the preceding five years.

The American Encyclopedia of Ophthalmology, 1919, p. 10472, states: "Such expedients are merely temporary and need only be alluded to".

235 South Fifteenth street.

SOCIETY PROCEEDINGS

Edited by Dr. H. Rommel Hildreth

ST. LOUIS OPHTHALMIC SOCIETY

April 22, 1932

Dr. J. H. Gross presiding

Present status of diathermy in ophthalmology

Dr. G. H. Poos read a paper on this subject which will be printed in this Journal.

Discussion. Dr. Howard C. Knapp inquired whether a safe dosage had been worked out as to strength in milliamperes and time of application that would avoid destruction of the tissues of the eye; also whether a prolonged application, forty-five minutes or so, had any effect on body temperature or other physiological effect beside that on the eye.

Dr. John Green had seen a number of cases of trachoma which had been treated by surgical diathermy at the U. S. Trachoma Hospital at Rolla, Mo., at periods of one to five days after the treatments. There had been considerable reaction, swollen lids, pain, chemosis, and congestion of the conjunctiva. Those in charge had not as yet been able to evaluate its use in trachoma but were encouraged to continue it.

Dr. Poos, closing, said that diathermy was still in the stage of investigation but believed it had a place in treating some conditions of the eyes. While it had been tried in many diseases with both favorable and unfavorable results it should not be condemned without trial. The understanding of the physics and of the machine employed favored success. The larger machines were preferable, as with them the dosage could be more accurately regulated. In medical diathermy the dose was controlled by the patient's comfort rather than by milliamperage. As stated in the paper, the average current employed was 350 to 600 milliamperes, the dose depending on size and type of electrode, the machine and the condition being treated.

Attention was called to a recent article describing the effect of diathermy on the blood and temperature which could be held at 105° to 108° as long as desired. In treatment of the eye the general body temperature was not affected.

Dr. Poos said he had inquired into Dr. Walker's treatment in glaucoma simplex in which the tension was reduced 5 mm. of Hg. in forty-eight hours after each application.

In his own experience both surgical and medical diathermy had proven gratifying. He was treating three cases of incipient cataract, had had favorable results in cases of iritis and atonic ulcers of the cornea, and had successfully treated neoplasms of lids and adnexa by surgical diathermy.

Stovarsol in the treatment of ocular syphilis

Dr. Wm. M. James presented a paper on this subject based on several months' experience in the syphilitic clinic of Washington University dispensary. This paper appeared in the January, 1933, issue of The Journal of the Missouri State Medical Association, p. 33.

Discussion. Dr. H. J. Howard requested further information as to the value of this drug compared with others, such as salvarsan, and asked how much the mercury treatment was thought to have contributed to the improvement noted.

Dr. R. E. Mason inquired whether there were any cases of syphilis in which it was contraindicated and if any symptoms such as nausea and the like, appeared from its use.

Dr. J. Ellis Jennings asked concerning its effect on optic atrophy.

Dr. James, closing, said that in view of the small series (eight cases) in which stovarsol had been given, he did not feel justified in making any positive statements comparing results with those obtained from routine treatment. In the first case cited there was marked improvement in visual acuity four

months after the initial examination and the Wassermann and Kahn tests had remained negative. In other cases no such results were obtained. His impression was that stovarsol was effective in acute conditions in children where often intravenous therapy was impracticable. He was disinclined to state what part mercury played as compared with stovarsol when used together. The first three cases cited had had the latter drug alone. He stated that the contraindications had not been determined, but some patients had tolerated up to 400 tablets in a period of four months. He quoted Matthews of Indianapolis as advocating for syphilitic children one 0.25 gm. tablet twice daily until the number of tablets given equaled the number of kilograms of body weight.

In the literature the dosage given was generally for cases of amebic dysentery, for which this drug was first prescribed in this country. The early toxic symptoms were nausea and diarrhoea. In one case a slight arsenical dermatitis had developed but in none of the eight cases reported was there gastroenteritis.

The action of stovarsol in cases of optic atrophy was being watched. Two patients were being treated with it along with mercury but no conclusions could be drawn as yet. The first case of interstitial keratitis had cleared without scarring, with vision of 6/4 but some deep vascularity remained near the limbus.

Paget's disease with optic nerve atrophy

Dr. Meyer Wiener reported a case of this rare condition in a man aged fifty-five years. The diagnosis was made from x-ray plates of the skull.

Discussion. Dr. Lawrence T. Post said he had watched a patient with this disease for a period of ten years. At first she had had fair vision, reading very well, but she had become progressively worse, being bed-ridden for the past five or six years. She had the characteristic wedge-shaped skull, an enormous head. Now stone deaf but not when first seen, she also had optic atrophy of low degree with marked degenerative changes of the retina. She was now about sixty-five years of age, her low vision, deafness and mental uncertainty made it difficult to communicate with her. Even with maximum magnification he said it was doubtful if she could read anything.

Dr. John Green said Paget's disease of the skull should not be confused with leontiasis ossea. He had studied a case twenty years before, in which the patient had had bony enlargement of the frontal region, marked separation of the orbits, giving a pupillary distance of 89 mm. There had been such marked exophthalmos that unless care was exercised the eyes would protrude in front of the lids. The diagnosis had been based on the fact that the condition was confined to the skull and on the presence of the typical bony bosses. There was no personal history of syphilis and the Wassermann was negative. Treated with small doses of calomel she had gradually improved, the globes receding, and the pupilary distance narrowing to 81 mm. There was partial opening of the nasal passages which had been completely blocked. From being hideous to look upon she became quite presentable. Dr. Green had the impression that optic atrophy was more frequent in leontiasis ossea than in Paget's disease.

Dr. Paul Wilson said he was interested in the loss of hearing, it being a well known fact that in many cases of Paget's disease deafness developed clinically identical with otosclerosis. He said Dr. Johnson of Chicago University had experimentally produced changes in the bones of young rats pathologically identical with the findings in Paget's disease. In working with puppies he had noticed they became deaf and developed cataract. Similar changes could be produced by feeding parathyroid extracts. Blood calcium had been found quite high.

Dr. Wiener, closing, said he had noted in a brief review of the literature that this case was different from the localized condition mentioned by Dr. Green. Many theories had been offered as to the cause of osteitis deformans, syphilis, internal secretory gland disturb-

ance and so on, and treatment along each line had been instigated but nothing so far tried had any favorable influence on the course of osteitis deformans.

B. Y. Alvis,
Recorder.

CHICAGO OPHTHALMOLOGICAL SOCIETY

Dr. Frank Brawley, president

May 23, 1932

Developmental lens defect

Dr. J. T. Stough presented a child two years and ten months of age. At the age of three months the parents noticed that the left pupillary space was covered by a grey film. Around this central area a gradual change to a black margin was noted. He was brought to the hospital about two weeks ago. There was no history of trauma or birth injury of any kind. Under atropin the refraction was: O.D. + 1.50 D. sph. = + 0.25 cyl. ax. 90°; O.S. + 8.50 D. sph. = + 1.00 cyl. ax. 90°. The left lens was thin, having about one-third the normal anterior posterior diameter. The central area showed a greyish irregular cataractous change with a few streaks radiating to the periphery. In view of the history it was felt that there had been some absorption.

Discussion. Dr. Robert von der Heydt remarked that it was quite difficult to make a correct diagnosis in a child of this age. The extensive involvement had greatly inhibited the normal development of new lens fibers. This, rather than absorption, accounted for the relatively thin lens.

Dr. Stough (in closing) said that in view of the refraction an attempt would be made to secure binocular vision by means of a lens. Experience showed that some patients could tolerate lenses with four, five or six diopters difference in strength and still have binocular vision.

The Guist operation for retinal detachment

Dr. M. L. Folk read a paper on this subject which will be published in the American Journal of Ophthalmology and showed a patient, fifty-eight years of age, who complained of a spot in the left eye. Examination disclosed a mild cataracta complicata, and detachment of the retina 3 or 4 p.d. below the disc. The retina was elevated 10 or 12 diopters, the detachment extending peripherally down and out as far as could be seen, it being globular in shape. A typical Guist operation was performed on May 5. The anatomical result was satisfactory, but the fields were not improved; they were contracted to 25 degrees from point of fixation. The remarkable thing about the operation was that it was followed by very little reaction and the vitreous remained perfectly clear. Dr. Benedict, who examined the patient, said that he had never seen a detachment operation leaving the vitreous free from floaters as in this case.

Discussion. Dr. O. B. Nugent asked how long the detachment had existed prior to operation, and how long the patient was kept in bed.

Dr. S. I. Kaufman said that he had examined this eye and found that the lenticular opacity was not sufficiently dense to call the attention of the patient to his sudden loss of vision. It seem plausible to suppose that this loss of vision occurred at the time the detachment first took place, several weeks previous to entrance into the clinic.

Dr. M. L. Folk (in closing) said that the detachment must have come on a month or two previous to operation. The exact time was not definite, as the patient was not aware of the detachment. At the time of operation the escaped fluid was not straw-colored, but was more or less pure vitreous. In the after treatment both eyes were bandaged for four days and he was kept in bed ten days. There was no cataracta complicata in the other eye.

A new suction method for the intracapsular cataract operation

Dr. William A. Fisher read a paper on this subject which was published in the September, 1932, issue of this Journal, p. 844.

Discussion. Dr. E. K. Findlay felt that in the Smith operation too much

pressure was required, and there had been some unfortunate results from the Barraquer operation. This operation of Dr. Fisher's seemed to be the simplest, easiest to perform, and to offer the best results. The pressure was light, and the movement seemed to be sufficient to tear the suspensory ligament below, and the lens tumbled out so easily that it appeared to be the safest operation for intracapsular extraction.

Dr. O. B. Nugent said he had for some time operated with a vacuum of 62 cm. Barraquer advised 60 cm., and Van Lint 58 cm. He had used this instrument in several operations, and had watched Dr. Fisher operate, and it seemed to be more satisfactory than any other method. The matter of pinching the iris was a thing everyone dreaded in doing a Barraquer operation, not so much on account of damage from suction into the air space, but that the lens could not be delivered while the iris was caught in the sucker. He had watched Dr. Fisher catch the iris and break the lens loose from its attachment and deliver it in the manner he described. In observing those eyes after operation, he found no damage to the iris. One could catch below on the lens over the iris, if on account of a small pupil it was necessary to break the fibers, not being afraid to cause damage to the iris.

Dr. Michael Goldenburg said, as he understood this procedure, it was the purpose of this apparatus to break up the zonular fibers. A comparatively short time after Smith was here and performed some operations at the Infirmary, those present were unfavorably impressed with the amount of pressure he had to apply. At that time Dr. Goldenburg devised an instrument for breaking the zonular fibers, consisting of a spatula made of tortoise shell, so bent as to fit the curvature of the lens. After making the corneal incision the instrument was passed under the iris and slid around as far as possible to break the zonular fibers without rupturing the lens capsule. About twelve or fifteen operations were performed by this method. Upon examination with the slitlamp, it could be seen that the vitreous protruded beyond the iris in some cases, although this was not visible with focal illumination. The operation by this method was therefore discontinued, although there was no question that the zonular fibers below were broken. The lens tumbled and the lower part presented before the upper.

Ophthalmic conditions in India

Drs. Cushman, Bothman and Nugent having recently returned from the Seth Heranand Charitable Eye Hospital in Shikarpur, Sind, India, gave an interesting résumé of the work done there during their two months' stay, and the conditions and complications encountered.

Dr. Cushman showed motion pictures of the hospital environment and described the class of patients with whom they had to deal, the lack of modern hospital equipment and supplies, and the handicap of ignorance and poor sanitation, with an almost total absence of asepsis as we understood it. Considering the conditions under which the work was done and the class of patients, the results obtained were surprisingly good.

Dr. Bothman presented a review of the number of patients, the operations performed and the results. There were few complications after operation, though it was not possible to follow up the patients for any length of time.

Dr. Nugent's motion pictures showed views taken in various parts of India as well as in Shikarpur. He also showed pictures taken on the homeward journey, at which time he visited many of the European clinics.

Robert von der Heydt

THE BRITISH MEDICAL ASSOCIATION

Section on Ophthalmology

Centenary meeting

July 27-28, 1932

SIR JOHN PARSONS, chairman

Ocular manifestations of lesions of the fifth nerve

Mr. R. Foster Moore said that the gasserian ganglion was the trophic center

for all the sensory branches of the trigeminal nerve, the most important somatic sensory nerve of the body. Any pathological process in the cells of the ganglion might be preferred to the corresponding point of its peripheral distribution. There were two anatomical factors which facilitated the spread of the stimuli within the fifth nucleus and from one nucleus to the other. First, individual fibers of the primary neuron ascending and descending gave off collaterals at different levels, so constituting a bond of integration between different levels in the nucleus. Secondly, there was a free communication between the two trigeminal nuclei, so that a close inter-communicating link was provided which associated together all the diverse tissues from which afferent impulses were directed to this nucleus.

Herpes corneae, with which were closely allied dendritic and stellate corneal ulcers, had little connection with herpes zoster ophthalmicus but there was a close relation between herpes zoster and varicella. Head and Campbell showed that the ganglion was in a condition of acute inflammation, with profuse hemorrhages into it and its capsule. Herpes zoster appeared to be an acute specific disease, some product of which showed a selective activity for the ganglion cells. The first local manifestation of the disease was pain over the area, which in three or four days would be the seat of a rash. The skin phenomena were: hyperalgesia with increased temperature, erythema, vesiculation, rupture of the vessels, cicatrization, and anesthesia. The ophthalmic division of the fifth nerve gave off a branch to the meninges before it entered the superior orbital fissure, the involvement of which might cause intense headache and vomiting, thus simulating meningitis. The secretory fibers to the lacrymal gland came from the facial nerve, and so the secretion of tears was not affected.

The most important complications of herpes ophthalmicus were those which involved the eye; corneal affections, iridocyclitis, ocular palsies, optic atrophy. The intraocular complications seemed to occur in about sixty percent of cases, and they usually occurred after the eruption had passed its acme.

The pathology of herpes zoster raised the question of the occurrence of antidromic impulses. In 1901, Professor Bayliss produced dilatation of the vessels of the hind limb of the dog by stimulation of the dorsal roots of certain lumbar nerves, and believed that the passage of the stimuli was by sensory components of the nerve, and was due to their capacity for antidromic conduction.

Mr. Foster Moore made observation on thirty-seven cases of cataract in an effort to discover how soon the sensitivity of the part of the cornea involved in the section was restored, the time of the observation varying between forty-eight hours after the operation to thirteen years. The restoration of sensation occurred from below up, and seemed to vary a good deal in its progress, but in some cases sensitiveness was impaired as long as four years after the operation. Anesthesia of the cornea alone would not produce ulceration.

(Reported by H. Dickinson)

COLLEGE OF PHYSICIANS OF PHILADELPHIA

Section on Ophthalmology

March 17, 1932

DR. LEIGHTON F. APPLEMAN, chairman

Intraocular sarcoma

Dr. H. Maxwell Langdon presented a forty-five year old man who had noticed failing vision in the right eye for two years and one year of complete blindness in this eye. The eye became greatly enlarged, being three times the normal size. There was replacement of the cornea by scar tissue. There was no pain until the day before coming to the hospital when a blow had made the eye very painful.

X-ray showed the orbit filled with new tissue but without involvement of the sinuses. The orbit was exenterated and was found to contain a solid mass in which the orbital contents were embedded and partially destroyed. Healing was uneventful. General physical

examination showed nothing wrong except some enlargement of the right portion of the thyroid. Two years later he died, probably of metastasis.

Sarcoma of the choroid

Dr. T. B. Holloway presented a male, aged twenty-three years, who had just come under observation. The right eye had been struck by a hammer three years ago, but the eye had remained quiet for a year. The vision of this eye then became impaired and had grown steadily worse. Upon seeking medical advice he was told that he had a detachment of the retina.

There were a few vitreous opacities. Beginning about a half disc diameter from the temporal side of the disc there was a large, round and well circumscribed solid detachment of the retina that extended over the macular region and far towards the periphery of the eye ground. At the extreme limit outwards one could see a small disc-sized choroidal erosion, just below the horizontal meridian. Deep vessels over the summit of the growth were rather conspicuous and in several places small vague areas of pigmentation were seen. The apex of the detachment could be clearly seen with a plus 20 D. lens.

X-ray diagnosis of double perforation of the eyeball after injection of air into the space of Tenon

Dr. E. W. Spackman read a paper on this subject that appeared in this Journal, v. 15, no. 11, p. 1007.

Discussion. Dr. Warren S. Reese said that the ingenious method that Dr. Spackman had called to our attention was an anatomical method in that it localized the foreign body in respect to Tenon's space. It therefore was not liable to the mistakes of interpretation common to the Sweet method. He described the success obtained in a case of his own, using this method.

Dr. A. Cowan said that the Sweet localization chart was based on the measurements of the schematic adult eye, 24 mm. in length. This 24 mm. was measured from the anterior surface of the cornea to the retina, so that allowance of about another millimeter should be made for the sclera. An infant's eye was so much shorter than an adult's, that this diagram could not possibly be used in young children to localize a foreign body.

Dr. Adler said it was true that not many cases would necessitate this differential test, but in the few cases it would prove very valuable.

Dr. Wm. Zentmayer asked whether in any one of the three cases reported, there was a subconjunctival hemorrhage. Such occurrence in injury by foreign body had been said to be indicative of double perforation. He had observed this at times.

Dr. Langdon described a case in which the foreign body had been localized by x-ray in the orbit. Enucleation was done after an attempt at removal of the foreign body in spite of the x-ray diagnosis. The foreign body was found in the eye and the eye measured abnormally long.

Dr. Spackman (closing) said that a foreign body might be outside the globe but appear within the globe on all three localization diagrams, because in the diagram we were looking at the equatorial planes. The following was a method by which roentgenologists determined this. If it was found that the position of the foreign body, in the diagram of the horizontal section of the Sweet eye localization chart, lay in any plane except the equatorial plane of the globe, which in this case was 12 mm. posterior to the cornea, a line was drawn through the actual plane bisecting the foreign body. The radius of the actual plane was then measured by calipers and a circle of the same radius superimposed on the front view of the localization chart. If the foreign body lay within the circle it was within the globe. If outside the radius of this circle it was out of the globe even though it might appear within the larger circle which represented the diameter of the equatorial plane. The description of this method was published in detail by B. S. Stevenson in October 1926.

Dr. Cowan's point was excellent, but as was so often the case, the anterior chamber was filled with blood and the

ophthalmoscope would not help to judge the length of the eyeball.

In reply to Dr. Zentmayer's question, one case showed subconjunctival hemorrhage.

Allergic investigations on twenty-three cases of vernal conjunctivitis

Miss Ida Teller (by invitation) said the work here presented was done in an effort to determine if vernal conjunctivitis had an alergic etiology. There were primarily four points studied on which this decision was to be made: (1) the allergic history of the patient, that is both the periodicity or return of symptoms at a given time of year, and the presence or absence of other allergic conditions; (2) the family history of allergy; (3) cutaneous tests to determine if the patients were sensitive to any foreign proteins with a study of the relationship of any positive reactions to the occurrence of vernal conjunctivitis; and (4) the eosinophile count in the blood and eye smear. A physical examination was also made on a number of these patients with special reference to any endocrine disfunction.

The results of this study showed that an average number of patients gave a history of other allergic conditions, although an unusually large number or twenty-one percent gave a family history of allergy.

The blood count for eosinophiles on thirty-five percent was above normal. Eleven patients out of twenty had eye smears containing eosinophiles.

Four cases gave positive reactions to skin tests done by the scratch method; although in only two of these cases did it seem likely that the sensitivity as indicated by the skin test could be the cause of the patient's vernal conjunctivitis.

Observations on eighty-seven cases of vernal conjunctivitis at the Wills Hospital

Dr. Louis Lehrfeld (by invitation) said the analysis of cases indicated that seventy-two percent were in males; fifty-three percent of the cases were lid types and forty-seven percent limbic; thirty-nine percent were in the age group under ten years; twenty-two percent, eleven to twenty years; twelve percent twenty-one to thirty years; six percent thirty-one to forty years; and the remaining three cases, forty-one to fifty-nine years. Conjunctival smears from forty cases revealed eosinophiles. Of seventy-two cases, thirty-one showed eosinophilia over four percent in the blood, the highest count in a limbic case being twenty-one percent. A description of the disease hinted that the limbic type and the lid type might be two separate diseases of allergic origin. There was pointed out that the negro presented only the limbic type; furthermore, that the limbic vernal conjunctivitis was limited to the spring and summer months, while the lid type might persist in a milder form throughout the winter; that vernal conjunctivitis was a self-limiting disease; and that the cobblestone description and the milky film, commonly described as characteristic, were seen only in the advanced types of the disease. The study also described the discharge in the advanced lid type as being typical and diagnostic of vernal conjunctivitis. It also pointed out that itching was a cardinal and diagnostic feature in all forms of vernal conjunctivitis.

Radium did not cure vernal conjunctivitis, but was valuable in alleviating the symptoms and reducing the pathology. Calcium gluconate given internally had a limited value in alleviating the itching. An excellent remedy proposed for the symptomatic relief was described as the "seven times treatment" consisted in bathing the eyes with an eye cup seven times a day, using boric acid solution, and the wearing of glasses intended as goggles to shield the eyes from exciting dusts.

The survey also pointed out the inadequacy of the scratch method in determining positive reactions in vernal conjunctivitis, and favored the intradermal method which gave a fair percentage of positive reactions, indicating definitely that vernal conjunctivitis was an ocular manifestation of an allergy.

Discussion. Dr. B. P. Widmann said that whatever might be the cause of vernal conjunctivitis, there were volu-

minous reports in literature that seemed to indicate that very gratifying benefits had been obtained with the use of radium. There was evidence to indicate that many cases showing good results were subject to seasonal recurrences. It was thought by Dr. Lehrfeld that this apparent tendency of only transient effects justified an intensive investigation of a group of cases treated with radium.

Desjardens (Amer. Jour. Roent. and Radiology, Nov. 1931) made an exhaustive review of the literature, experimental and clinical, demonstrating the action of x-rays and radium on the eye. He found that three months after birth the eyes of cats and rabbits were no longer affected by doses that were tolerated by the skin.

The rationale of radium treatment in vernal catarrh was supported by the good effects of radiation for innumerable inflammatory conditions, such as, adenopathies, boils, carbuncles, eczema, erysipelas and a variety of skin diseases. The mechanism effecting good results in these inflammatory tissues was not understood, but much credit was given to the profound leucocytic infiltration resulting from radiation.

Experience with radium at the Wills Hospital was quite in accord with phenomenal regressions and almost specific effects noted by others. Twenty cases received radium treatment. The majority showed clinical regressions of the local pathology. Symptomatic comfort to complete relief was common. Practically all of the recurrent cases showed seasonal recurrence of symptoms, equal to the distress at start of treatment. Many of the cases showed no detectable evidence of local pathology; no vestige of the original character of granulation tissue but presenting symptoms of itchina and pain, comparable if not worse, than the symptoms at the onset of treatment. Only about fifty percent of the recurrent cases, presenting no detectable local pathology, were relieved symptomatically with further radium treatment. It was potentially hazardous to continue radium treatment for successive recurrences, particularly because of the risk of obtaining cumulative effects of radium.

Dr. Alexander Clarke said that the evidence in favor of vernal conjunctivitis being an allergic phenomenon lay in the similarity to hay fever. Both occurred in summer, had manifestations in the eyes, positive skin reactions to pollens and often, other manifestations of allergy. Eosinophiles were present in the typical secretion from each. The evidence against vernal conjunctivitis being an allergy consisted, first in the absence of family history of vernal conjunctivitis. Dr. Lehrfeld had said that he had never seen two cases of vernal conjunctivitis in the same family. While both had positive skin reactions, it was necessary to use a solution one hundred to a thousand times stronger to get a skin reaction in vernal conjunctivitis than was necessary in hay fever. In hay fever the severity of the symptoms varied directly with the amount of pollen inhaled. Vernal symptoms, on the other hand, did not follow the pollinating periods, but were influenced more by temperature. A very small number of persons suffering from vernal conjunctivitis had been given hay fever treatments, using much larger doses. The results seemed to be worth continuing.

The pathology of hay fever was an urticarial swelling which could be entirely removed in a few minutes by the use of adrenalin, whereas the pathology of vernal conjunctivitis, was a persistent granulation. In this respect vernal conjunctivitis seemed to be more nearly related to eczema, an allergy characterized by a persistent inflammation. He felt that vernal conjunctivitis was an allergy of the eczematous type, rather than of the urticaria or hay fever group.

Dr. G. E. deSchweinitz said he was satisfied with the therapeutic value of radium, especially in those varieties of this conjunctival disease with large lesions. He agreed that the efficacy of radium was enhanced if prior to its use, the surface of the grossly developed granulations, were shaved off.

Dr. Shumway thought that radium had nothing to do with causing ulceration or opacities of the cornea. He felt such trouble was due to mechanical irritation, from the rubbing of the

growths on the lids over the cornea.

Dr. T. B. Holloway mentioned the use of fibrolysin which he had found the most satisfactory of any of the drugs that had been suggested for this condition.

A. G. Fewell,
Secretary.

BROOKLYN OPHTHALMOLOGICAL SOCIETY

April 21, 1932

Dr. John N. Evans, president

Errors in diagnosis

Dr. Algernon B. Reese (by invitation) presented a paper on this subject. A critical analysis of various errors in clinical diagnosis was discussed and lantern slides of specimens were projected to illustrate these. The following groups of cases were discussed and demonstrated.

1. Where intraocular sarcoma or carcinoma were present and not diagnosed. Some of the incorrect diagnoses in these cases were senile cataract, acute primary glaucoma, exudative choroiditis of the macula.

2. Where intraocular sarcoma existed but its true nature was unrecognized. These included juxta-papillary sarcoma of the choroid, diagnosed as sarcoma of the disc; and sarcoma of the ciliary body with extension into the iris, diagnosed as sarcoma of the iris.

3. Where intraocular sarcoma was diagnosed and not present. These included hemorrhage of the vitreous with hemosiderin changes, hemorrhage in the choroid, scleritis with detachment of the choroid, imbedded foreign body of the iris and a cyst of the corona ciliaris which pushed the iris forward against the posterior corneal surface.

4. Where retinoblastoma was present and not diagnosed in a case of phthisis bulbi.

5. Where retinoblastoma was diagnosed and not present. These cases included remains of the tunica vasculosa lentis and old metastatic endophthalmitis.

6. Orbital conditions: (a) basal cell carcinoma (cylindroma) of the orbit with glaucoma and no exophthalmos, diagnosed as primary glaucoma, (b) congenital orbital cyst with exophthalmos of normal sized globe and atypical coloboma of the disc, thought to be orbital neoplasm or inflammation, (c) chronic inflammatory process (pseudo tumor) diagnosed as orbital neoplasm, (d) tuberculosis of the posterior half of the globe with extension into the orbit causing exophthalmos. The anterior half of the globe was relatively normal.

Unilateral fundus changes simulating retinitis pigmentosa

Dr. Francis I. Richman presented a girl of ten years, with poor vision in the right eye. Following a severe fall at two years of age she had been unruly, underdeveloped, and extremely nervous. There was no consanguinity of the parents; no poor vision in the near relatives. Blood tests and other examinations had been refused.

Vision of the right eye was hand movements; good light perception and projection. Occasional internal squint. Numerous spider-shaped pigment corpuscles were seen arranged in an annular band in the intermediate zone of the retina. There were a few small white spots scattered throughout the fundus. Around the disc the fundus was tessellated because of the retinal atrophy. The disc had a waxy pallor; the vessels, both arteries and veins, were markedly attenuated. The pigment was thickest along the course of the retinal vessels. There was a cilio-retinal vessel running down and out, seemingly of normal size. The field could not be taken in this eye because of lack of fixation. There was no complaint of hemeralopia.

The left eye was normal; vision with +0.50 D.sph. was 20/20. The field was full.

Squamous-cell epithelioma at the limbus

Dr. George Freiman reported a case was published in the December, 1932, issue of this Journal, p. 1157.

George Freiman,
Associate Secretary.

COLORADO OPHTHALMOLOGICAL SOCIETY

April 16, 1932

Dr. C. E. Sidwell presiding

Incipient lens opacity in a young man

Drs. Wm. M. and Wm. C. Bane presented R. S., aged eighteen years, who had been examined first in 1927. The right pupil was larger than the left but reactions were normal. No pathological changes in media or fundi were discovered. The refraction revealed hyperopia of about four diopters in the right eye. With correction vision was O.D. 5/6+, O.S. 5/4.

In March of this year, he had returned for a change of glasses. Refraction revealed a little less hyperopia in the right eye, and vision with lens was O.D. 5/6—, O.S. 5/4—.

During this examination, a very thin opacity was discovered in the right lens with the ophthalmoscope. The opacity was roughly 5 mm. in diameter with the upper margins irregularly notched but definitely outlined. The lower temporal edge was circular in outline. The diameter corresponded closely to that of the fetal nucleus. The cortex of the lens was clear.

The Doctors Bane believed that this cataract was developmental, according to Duke-Elder's classification.

Discussion. Dr. Donald H. O'Rourke asked whether it was the practice of the members to prescribe dionin in incipient lens opacities. He said that he had had one patient who had had such a tremendous reaction from its use that he had hesitated to try it again.

Dr. Wm. H. Crisp felt that the effect of dionin was purely psychological. He mentioned that he had had patients who claimed better vision after the use of various innocuous drugs. He started with two percent solution of dionin and increased the strength later because of the local tolerance.

Dr. D. G. Monaghan said that it was his custom to use five to ten percent once a week in such cases, explaining to the patient that he promised no beneficial result.

Dr. C. A. Ringle said he ordinarily used five to ten percent solution, but had even used the dry powder with practically the same reaction as with these solutions.

Laceration of cornea and lens

Dr. Wm. H. Crisp showed a boy of five years who on April 11th had received a lacerating injury from a stick. The cornea was ruptured almost from edge to edge in approximately the horizontal meridian, and the lens capsule and substance had been caught in the lips of the wound. The process of absorption and healing seemed to have come to a standstill. The eye was atropinized, but there were occasional periods of pain. Dr. Crisp said he had not used a conjunctival flap, because he believed it would increase the density and opacity of the scar.

Retinitis pigmentosa

Dr. I. E. Hix presented a colored male of fifty-one years. He had been working at night building fires in locomotives. He claimed that he had noticed nothing wrong with his eyes, and particularly no difficulty in seeing in the twilight or at night, until four or five years ago. He did not know of any similar trouble among his relatives.

The diagnosis of retinitis pigmentosa was offered because of the more or less typical bone corpuscle spots of pigment, very scarce in the central areas and very numerous in the periphery with a relatively uniform appearance of intervening retina, and without any spots of exudate or choroidal involvement. He had a negative blood and spinal Wassermann and colloidal gold test.

Discussion. Dr. G. H. Stine thought he could see cholesterin crystals in the retina and wondered whether any members had seen them before in such cases.

Senile cataract

Dr. C. E. Sidwell presented H. F. K., a sixty-two year old merchant who had complained of failing vision in the right eye for about a year. The left eye was already practically blind from cataract. Vision in right eye was 20/50. Dr. Sid-

well thought he could also see a good sized exudate in the vitreous to the temporal side; media not wholly clear; vessels indistinct, but narrowed in places; and nerve-head slightly swollen.

Discussion. The members were not sure of the presence of the exudate, and recommended removal of the cataract of the left eye.

Recurrent corneal ulcer

Dr. C. E. Sidwell presented A. E., a fourteen year old male whose complaint was soreness of the eye and epiphora. He had had ulcers of the cornea at the age of the six years. On August 31, 1931, he had been examined because of poor vision. After refraction under cycloplegia vision was improved to 20/25 in the right eye and 20/40 in the left eye.

On examination one saw a poorly nourished boy with epiphora and photophobia. There was marked infiltration of the surface of the left cornea, pannus and peculiar staining with fluorescein. Tonsillectomy had been done about two weeks after he was first seen and then was the first time that much change was noticed. On April 4th, both antra were irrigated and a large amount of pus was found in each side. There had been slight but steady change for the better. Recent Von Pirquet reaction was positive. The usual treatment had been given but improvement was not marked.

Discussion. Dr. Wm. H. Crisp recommended the use of cod liver oil and general heliotherapy in such cases.

Dr. D. H. O'Rourke suggested the Birch-Hirschfeld lamp, and did not favor tuberculin in corneal cases. He quoted Lemoine as advising 1/10,000 mg. of B. E. tuberculin every 10 days.

Dr. Von Brobeck said that cod liver oil had been used locally in such cases.

Optical iridectomy

Dr. R. W. Danielson presented A. J., a fifty-three year old miner, who had had both eyes injured by an explosion many years previously. The left eye had been removed at the time. The right eye had a corneal injury; the lens was opaque and dislocated, hanging at the upper nasal side. The iris was drawn up to the wound so that the small remaining pupil was in front of the dislocated lens. Dilating the pupil by atropin had given him increased vision, so an iridectomy was done making the incision under a conjunctival flap at the inferior and lower quadrant. Vision with a +15.00 D.sph. was now 4/20.

Discussion. Dr. Wm. H. Crisp believed the vision would have been as good or better if the iridectomy had been made smaller. He recommended the use of a magnifying glass for the patient's work as a prospector.

R. W. Danielson,
Secretary.

AMERICAN JOURNAL OF OPHTHALMOLOGY

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PROGRESSIVE OPHTHALMOLOGY

Three years ago a little arithmetic, as far as simple proportion, showed that an up-to-date textbook on ophthalmology, gave nine-tenths of its space to things that had not been imagined one hundred years ago. The progress of science, like the motion of a falling body, is continually faster and faster. The growth of the science and literature of ophthalmology illustrates this tendency. In the November number (p. 1081) the comparison of the textbooks of Fuchs and de Schweinitz with the first of Duke-Elder's three volumes calls attention to this growth. But this characteristic of the age in which we live is such a reversal of the relative importance of the old and new in our literature, that it must be emphasized before it can be appreciated, or even noticed.

Volume 14 of the American Journal of Ophthalmology was larger than any of its predecessors. But the pressure for more space continues, notwithstanding the development of two other excellent journals now published in English. This increasing volume of special literature was suggested by looking over the November issue of this journal. The first article commands attention to the application for injuries of the eyeball, of a method of examination that has, in the last few years, revolutionized the localization of brain tumors. Next, the prolonged occlusion test for latent heterophoria was described by Dr. Marlow in Volume 4. It is particularly important to reveal the amount of hyperphoria. But only in the last two years has its liability to mislead the clinician, with reference to this form of imbalance, been brought to our attention; and this issue of the Journal compels us to take it into account.

The existence of ocular papillomata was brought out by Gayet in 1879; and in America by Ayres in 1891. But a general roundup of various recorded cases, and the literature referring to them, appears in this issue. Then a case of gas bacillus infection with intraocular foreign body, calls attention to an emer-

gency that most of us have never recognized. The defects of the visual fields connected with endocrine disturbances have only claimed attention within the last ten years. Contact glasses have been before the profession since 1888; but only in the last five years has their practical importance received attention in our journals. The x-ray and radium have been extensively used about the eye, since these important therapeutic agents were discovered, but only in this November issue is the risk of causing cataract by radiation fairly estimated, by bringing together the clinical experiences of our profession bearing on this point.

The seven papers above referred to have bibliographies containing 129 references. Of these only two go back to literature of more than 30 years ago. These illustrate the rapidity with which ophthalmic knowledge and ophthalmic art are extending; but they do not tell the whole story. The 22 illustrations, in seven of the 11 original papers, carry information that makes the reading of the printed page more like the personal assistance of a good teacher. The editorial on the prolonged occlusion test emphasizes the practical bearings of the information given in the paper. Most of the eight society proceedings report original cases. From one society come two cases of bilateral tear-gas injuries, and two of electric cataract; forms of injury that are becoming of great practical importance.

The editorial department may not rank with the original articles, as to new ideas promulgated. But the five editorials do give points of view and emphasis, that help shape the thinking of the ophthalmologist about his work. Such helps are needed by all isolated physicians and surgeons engaged in special practice. Under correspondence we have information that will be of interest to every one who is thinking of attending the International Congress of Ophthalmology at Madrid. The book notices bring to our attention two really important new books.

The abstract department, with its abstracts of 142 papers prepared by 17 workers, who are giving a large part of their time to critical reading of the 21 journals, from 13 different countries, that published the papers noticed, gives a broader picture. This again illustrates the rapid expansion of the knowledge of ophthalmology, and the necessity for its broad and systematic study, by every one who offers his services to a community; as able to give people the benefit of the present knowledge and resources, of this special branch of medical practice.

It is not enough thus to glance over the last issue, as we each day glance over the morning paper. When the December number comes with the annual index, the whole volume should be arranged, tied together, and marked with the year; whether they are to be bound, or simply placed in order with other volumes on a closet shelf. The more profitable kind of reading: when a case suggests a particular subject, to use the indexes, to guide us promptly to all the later literature that bears upon it. From careful reading of this kind one may reach as sound judgments, as are possible from a large experience as one may hope to have, in a long professional life. The experience of the profession teaches more than the greatest possible experience of an individual.

Edward Jackson.

INTERNATIONAL OPHTHALMOLOGY

The Annual Report of the Giza Memorial Laboratory for 1931 gives a brief account of an interesting ceremony which took place in that Laboratory, March 15, 1931. It was the unveiling of the bust to Mr. A. F. MacCallan, C.B.E., M.D., F.R.C.S., former Director of the Government Ophthalmic Hospitals of Egypt. The bust was presented by the Egyptian ophthalmic surgeons, trained by MacCallan during the twenty years he had served as Director of Ophthalmic Hospitals in Egypt, and "building up what is now the greatest state ophthalmic organization in the world". As Dr. Shahin Pasha, Secretary of Public Health, said in receiving the Memorial Bust: "The very fact that the ophthal-

mic surgeons whom he had personally trained were unanimously desirous of honoring his memory was a palpable proof of the gratitude which they felt toward him."

Amid the political difficulties that have clouded the good understanding between Britain and Egypt, the work of MacCallan and the financial support of Sir Ernest Cassel, which made it possible; with the marks of appreciation that have been shown for it by Egypt, constitute an important landmark on the highway to international peace and cooperation. Among the difficulties that have arisen about British control in India, the record of the ophthalmic hospitals, founded and controlled by men who went out there from the Moorfields Hospital of London, is one to which the admirers of western science and of imperial ambition may always turn with satisfaction. Real ophthalmic service has won respect and influence for Great Britain in Asia and Africa, as it has in English-speaking America.

Edward Jackson.

SECONDARY INFECTIONS IN TRACHOMA

In spite of voluminous investigation and many confident opinions, we lack unanimity even as to the nature of trachoma, and still more as to its etiology. The very definitions of trachoma differ widely.

Follicular conjunctivitis is regarded by most physicians as an independent condition, but in the opinion of others it is simply a form or stage of trachoma. After Noguchi had made his famous experiments on monkeys as to the relationship between Bacterium granulosis and trachoma, Lindner examined these monkeys and expressed the opinion that the conjunctivitis produced by Noguchi had nothing in common with trachoma but was merely a folliculosis; yet Ernst Fuchs was satisfied that Noguchi's monkeys were suffering from "undoubted trachoma." If one clinician shows a case of trachoma which has yielded to removal of some apparent systemic or neighborhood cause, other clinicians will always be found to deny that the case was one of trachoma at all.

The balance of opinion is in favor of the transmissibility of trachoma, yet many able writers have argued to the contrary. It is unfortunate that so far no animal has shown typical trachoma when inoculated with the disease from the human conjunctiva, and Wilson and others have recently emphasized the view that no satisfactory conclusions will be reached so long as experimentation is confined to animals, but that experimentation upon human volunteers is essential.

As quoted by Wilson (Bulletin of the Ophthalmological Society of Egypt, volume 24, page 38), the authors of the chapter on trachoma in the System of Bacteriology, published by the General Medical Research Council of Great Britain, suggest that "trachoma does not supervene on a normal conjunctiva but that some form of inflammatory reaction is necessary before the condition appears." Some have regarded trachoma as a deficiency disease, and it is true that trachoma occurs particularly in populations among which undernourishment or malnutrition is common. Yet in such classes the absence of cleanliness and general hygiene is probably just as important.

It seems not altogether unlikely that the symptom group to which we now attach the title "trachoma" will ultimately be analyzed as a clinical picture capable of production by a variety of chronic causes. Among those chronic causes will perhaps be included, as the commonest and most important, a specific disease for which the name "trachoma" will still be retained.

MacCallan asserts that acute trachoma occurs but rarely, the so-called acute forms actually arising from superimposed infections, especially by the gonococcus or the Koch-Weeks bacillus. The same opinion is expressed by Morax. Morax is also among those who have denied that the trachoma follicle is truly characteristic of trachoma. In some cases, he observes, the conjunctival lesion is a diffuse infiltration without definite formation of follicles; while on the other hand the histological structure,

the distribution, and the cicatricial changes of the trachoma follicle do not justify a diagnostic distinction between it and the follicles of other types of conjunctivitis. Nor, according to MacCallan, may even corneal pannus and tarsal scars be regarded as characteristic of trachoma.

Nicolle, Cuénod, and Blaizot, well known French investigators at the Pasteur Institute in Tunis, express the following opinion: "It is possible that under the name of trachoma we today confuse infections due to different invisible and nonseparable viruses, whose action is expressed by the same conjunctival reactions, under the form of granulations."

Ruata (Rassegna Italiana d'Ottalmologia, volume 1, page 437), working among Italian children at Cairo, Egypt, supports the opinion of Angelucci of Naples that trachoma occurs particularly in individuals of a lymphatic or adenoid diathesis. Ruata therefore investigated the possibility of curing trachoma by means of a mixed bacterial vaccine. He actually used a polyvalent stock vaccine directed against all the bacterial infections of the eye, and prepared by inoculating various culture media with the conjunctival secretions from trachoma cases with superimposed infections.

The vaccine was administered in the form of subconjunctival injections every second day, increasing the dose from 50 million to a maximum of 250 million. Daily swabbings with the vaccine were also used, but no other treatment.

Only twenty-two cases are reported upon in Ruata's preliminary communication. These included nine cases of florid acute trachoma with pannus and keratitis; five cases of severe corneal ulcer and trachoma; two cases of perforated ulcer with iridocyclitis; one case of purulent gonococcic ophthalmia with corneal ulcers; two cases of diplobacillary infection superimposed upon cicatricial trachoma, with chronic blepharoconjunctivitis and corneal pannus; and three cases of mucopurulent conjunctivitis from the Koch-Weeks bacillus. In every case the result was favorable, with regression of symptoms in a period of from eight to twenty days and after at most ten injections.

Thygeson (in a personal communication) suggests a probability that "the problem will be finally solved before too many years have elapsed." If so, we must be in the dark before the dawn. The limited transmissibility of trachoma is emphasized by Redslob (Revue Internationale du Trachome, ninth year, page 24), who found that among 304,000 Alsatian soldiers living in miserable conditions and exposed to trachoma in the population along the Russian warfront, only three developed this disease. Wilson's study of the Egyptian village of Bahtim (Giza Memorial Ophthalmic Laboratory, sixth annual report, page 88) leads him to the conclusion that trachoma is invariably associated with pannus, and that this lesion is an essential part of the disease. Step by step, we may approach a more strictly defined conception of trachoma, and from this refined understanding bacteriological research may lead almost unexpectedly to disclosure of the offending virus.

W. H. Crisp.

NURSES' TRAINING

Those of us who are engaged in the instruction of nurses in ophthalmology in the various hospital training schools have a wonderful opportunity for the dissemination of proper ophthalmological knowledge to the lay public. The nurse comes intimately into contact with many patients and friends by whom her advice is sought before the services of an ophthalmologist or other practitioner are employed for the relief of the eye condition from which they suffer.

If, in addition to the usual curriculum of how to prepare eye dressings, dressing trays, and how to handle ophthalmic instruments the class of nurses has been enlightened in a simple manner as to the problems of optometry, the inefficiency of muscle exercise for the elimination of errors of refraction, and the reason why eye examinations should be made by a graduate in medicine, these nurses may do a great deal toward elimi-

nating the general misunderstanding of the public concerning certain of our present problems.

Certainly in this day of fraudulent advertising it behooves all ophthalmologists to see that the public receives correct information concerning ophthalmic practice through as many proper channels as possible. Each individual instructor can best work out in his own way the manner of imparting such information to his student nurses, but let us by all means be certain that they do not become a party to the spread of false conceptions through lack of proper education by ourselves.

M. F. Weymann.

THE EDITORIAL BOARD

The beginning of the new year witnessed a change in the personnel of the Editorial Staff of this Journal and we cannot let the occasion pass without expressing our sincerest appreciation of the aid and support of those retiring from the Board and a welcome to the new members.

The retiring members are Dr. E. C. Ellett and Dr. Clarence Loeb. Dr. Ellett has served for the past four years and during his term has lent his wise counsel and continual support to the Journal and we wish to acknowledge his generous help. Dr. Loeb's association with the Journal dates back to the beginning of the combination of the six publications into one, under the name of the American Journal of Ophthalmology. Too much could not possibly be said in praise of the devoted service that he has rendered the Journal through these years as associate editor and treasurer. For many years much of the management was in his hands and his numerous original contributions and editorials are well known to our readers. It has been a matter of great regret that for the past few years ill health has forced his withdrawal from active participation in literary production. We take this opportunity upon his retirement from the Board to express sincere sorrow for his continued ill health and a keen appreciation of the loyalty, devotion and tireless effort that he has given the Journal through the many years of his association with it.

We welcome three new members to the Staff; Dr. Park Lewis, who needs no introduction to any ophthalmologist at home or abroad and who has been a frequent contributor to our columns in the past; Dr. H. Rommel Hildreth, who has been conducting the section of Society Proceedings for the past year and a half; and Dr. Morie F. Weymann, who has recently been appointed Associate Professor and Chairman of the Department of Ophthalmology in the University of Southern California.

Lawrence T. Post.

MEDICAL CARE FOR THE AMERICAN PEOPLE

This two hundred page text, from the University of Chicago Press, has been so extensively discussed in professional and lay journals that further comment may seem unnecessary but the subject is so vital that reiteration may be pardoned.

This book is the final report of the committee on the cost of medical care. After five years of work the task is done and recommendations are made. Certain of these are obvious and generally agreed: for example: Medicine of the future must be more preventive; the cost of medical care should be equally distributed; rural communities should have physicians, hospitals, etc.

The chief difference of opinion which necessitated a majority and a minority report was the recommendation of the majority that medical care should be given, so far as possible, by organized groups; cost of this care to be distributed over a large number of individuals by a group insurance plan. The hope is expressed that this might be voluntary but the actual fact that voluntary insurance of this kind has had to be replaced by compulsory is also noted. In contradistinction to this, the minority recommends that united attempts be made to restore the general practitioner to the central place in medical practice. Another important recommendation of

the minority was that the Government, in so far as possible, withdraw from the medical fields where its activities were in competition with the medical practitioner.

In the second paragraph of the second chapter it is stated that the first basic essential of any plan is that it "safeguard the quality of medical service and preserve the essential personal relation between the patient and physician." To this we heartily agree but doubt if any handling of patients by groups can accomplish it.

The necessity for a special study of the patient from angles which cannot be reached by the general physician is rather stressed in the report. It is true that the proper study of a certain percentage of patients can be carried on adequately only after a number of consultations such as x-ray, dental, and otolaryngological, but patients such as these are by far the exception rather than the rule. In our own specialty and in general practice, probably from seventy-five percent to ninety percent of patients need no studies that cannot be made in the physician's office.

That machinery should exist for the full study of such cases as need it, at a cost within the means of the patient, would certainly be most desirable but that such a machine should be the center of medical practice seems scarcely the best answer to this phase of the problem.

Fortunately there is not any marked tendency towards radical changes in medicine in our country so that progress will be allowed to take its slowly selective course. This may not be the quickest way towards the perfect goal but it is by far the surest way and it will permit of readjustment as developments gradually occur and the country and the medical profession will not be thrown into a panic by a sudden revolutionary act which might not prove the *Summum bonum*.

Lawrence T. Post.

BOOK NOTICES

The main afferent fiber systems of the cerebral cortex in primates. By Stephen Poliak, M.D. University of California Publications in Anatomy. Vol. 2, 384 pages, 96 figures, many colored. University of California Press. Berkeley, Calif., 1932. Price $10.00.

This large monograph is one of the most outstanding contributions to this subject that has yet been published. It is a fitting sequel to the work of Brouwer and Zeeman in 1920. (Brain, vol. 49.) The problem was studied by producing lesions in selected areas of the brains of monkeys. The animals were sacrificed after varying periods. The material was stained after the Marchi method which produces a black stain in degenerated nerve tissue. The results in eight monkeys are recorded and the interpretation of these with reference to the three principle afferent systems, the somato-sensory, the auditory and the visual, is given. Then follows a chapter on general considerations with a final chapter on suggestions for future investigations.

No attempt will be made here to review the subjects of the somato-sensory and the auditory systems which occupy somewhat less than one-half of the reading matter. The following is a partial summary of the facts regarding the visual system established by the experiments.

1. "The external geniculate body of the between-brain must be recognized at present as the only and exclusive origin of the visual radiation in primates.

2. "There exists only one single direct afferent visual path from the subcortical region to the cerebral cortex. It is the fiber system originating from the external geniculate body.

3. "The cortical region where the visual path terminates is a single definite and sharply delimited area. . . . No other areas of the cerebral cortex receive afferent visual fibers.

4. "The central visual path above the external geniculate body is strictly unilateral. No evidence exists of a partial decussation of its fibers through the

corpus callosum. The only spot, therefore, where the visual path undergoes a partial decussation is below the between-brain and the optic chiasm.

5. "The fibers of the visual radiation are, on the whole, finer than the somatosensory fibers.

6. "The visual radiation is composed of fibers grouped into fiber bundles arranged on the whole in parallel fashion. Each fiber bundle originates in a definite small segment of the external geniculate body and terminates in a definite small segment of the striate area."

7. In this division the course and character of the visual radiation is described in detail.

8. In this section the projection of the retina upon the cortex in primates and man is outlined. The new features are the very large macular area, the fact that it does not extend anteriorly in close proximity to the calcarine sulcus. The fovea-centralis is located close to the shallow impression of the external calcarine sulcus or superior occipital sulcus. The extra-macular distribution is over a much smaller area and roughly bounding the macular area of distribution. There is no bilateral representation of each total macula. The fact of retained central vision in hemaniopsia is explained by the situation and extent of the macular cortical areas. It was found further that beyond the perimacular areas there were rather large regions associated or connected by fibers from the macular and perimacular areas but having no direct connection with the visual radiation. These undoubtedly constitute association areas.

Excellent illustrations in black and orange demonstrate in serial sections the paths of degeneration. An extensive bibliography of sixty-one pages is appended and also a very complete index to the monograph.

The reviewer cannot speak too highly of this wonderful research. The work itself and its method of presentation deserve the highest praise. Every ophthalmologist should familiarize himself with this contribution.

Lawrence T. Post.

Nettleship Memorial Volume, Part V (Concluding section) On some hereditary structural anomalies of the eye and on the inheritance of glaucoma. By Julia Bell, M.A., M.R.C.P., with five illustrative plates and thirteen pedigree plates. Paper covers, 130 pages. Cambridge University Press, London: Fetter Lane E. C. 4. Price, thirty-six shillings, 1932.

This is the concluding section of the Nettleship Memorial Volume. It is divided into three chapters. I. Anomalies and Size of the Eye. II. Hereditary Glaucoma. III. Congenital Anomalies of the Iris.

There is an extensive bibliography of 294 references and numerous pedigree plates showing heredity, with extensive descriptions of the cases included in these plates. There are also five photographic inserts.

Chapter one includes consideration of microphthalmos, megalocornea and buphthalmos. Microphthalmos usually shows an associated maldevelopment of the iris and lens; lack of uniformity in the high associated areas; rarely glaucoma; and seldom any other bodily abnormality.

Megalocornea has not been extensively studied from an hereditary standpoint. Usually it presents pedigrees in which all affected members are of affected parentage and also typical relatively sex-limited pedigrees in which the defect is transmitted for the most part through unaffected females to their sons. There is commonly an iris tremor and vision a little below normal. Embryon-toxon is rather frequent.

Buphthalmos is divided into an hereditary type and nonhereditary type, the latter being by far the more frequent. In the hereditary type the defect is bilateral in almost ninety percent of the cases whereas in the nonhereditary type only about sixty-five percent are bilateral. Hereditary apparently does not extend through many generations but is not uncommon in siblings.

Chapter two is an attempt to study the inheritance of hereditary primary glaucoma through a consideration of the hereditary tendencies of congenital

anomalies of the iris, aniridia and coloboma-iridis.

Obviously this monograph represents an enormous amount of work and will always be valuable as a source of reference. The data at best are somewhat insufficient and conclusions have to be drawn from the material with great care and the admission that they are suggestive rather than proved.

Lawrence T. Post.

Measurement of visual acuity. By R. J. Lythgoe with assistance of Dorothy E. Corkill and with a section by E. S. Pearson. Medical Research Council. Reports of the Committee upon the physiology of vision. Paper bound, 82 pages. Price, one shilling, six pence net. Published by His Majesty's Stationery Office, London, 1932.

This is an extremely thoughtful study of this subject considering minutely the many factors that enter into the problem. Its complications are suggested by enumerating some of the difficult factors such as a choice of end-point, whether this shall be where the subject is doing just a little better than guess work or where he has just begun to make mistakes or some intermediate point. The variation with the size of the pupil is of great significance as is the relation between acuity and illumination, which concerns not only the brightness of the test object but that of the surrounds. Those who are interested in technical study of this subject will find this monograph of great interest and value.

There is a long list of references appended, as well as an excellent index.

Lawrence T. Post.

CORRESPONDENCE

Prolonged occlusion test for hyperphoria

The recently published criticisms of the Marlow occlusion test by Abraham and Beisbarth call for a reply in order to set the profession straight.

Abraham states positively that "The occlusion test is a subjective test for demonstrating the presence of Bell's Phenomenon and is not a test for latent hyperphoria". I am curious to know who claims it is a test for latent hyperphoria alone. Marlow and myself both agree that it is essential to an accurate estimate of the *total heterophoria.* The fact that it so often brings to light a latent hyperphoria is merely incidental.

My understanding of Bell's Phenomenon is that it is dependent on closure of the lids and not on covering the eye. This brings out the need for making the test properly. Abraham states that he uses an occlusive pad held firmly in place by adhesive strips. This produces a pressure displacement of the eye which gives erroneous results. I found this out early in my work with the test. The eye should simply be covered with a curtain of material fastened at the brow and held in place by loosely applied adhesive behind which the eye can be kept open.

The test then becomes merely a *prolonged dissociation* in no way different, in principle, from all of our muscles tests which are *short dissociation* ones.

If the results of an occlusion test are simply a manifestation of Bell's Phenomenon why should it take at times as long as ten days to develop the total deviation? This brings out the fact that the critics of the test do not even take the trouble to make it as insisted upon by Marlow and myself. Both Abraham and Beisbarth cite cases occluded no longer than an hour, they cite cases incidentally occluded for other reasons and they fail to mention whether or not the tests given are consistent.

Marlow's reports as well as mine were all on people suffering from asthenopic symptoms not relieved by ordinary measures.

Abraham was kind enough to admit that the good clinical results of treatment, based on the occlusion findings, are hard to explain. He also states that most of the cases reported showed some hyperphoria before occlusion apparently overlooking my paper before the 1926 Academy meeting in which were listed 110 cases testing exact orthophoria before occlusion. Also a paper before the 1929 Cal. St. Med. Soc. reporting the re-

sults of occlusion in 24 apparently orthophoric emmetropes *all of whom had asthenopic symptoms.*

Bell's Phenomenon, as shown by his own pictures, is a condition so marked as to be apparent to the naked eye and is therefore, in degree, a squint. Nothing like that happens after occlusion.

He will find in my 1926 paper cases of 8, 9, 10 degree hyperphoria, disclosed by the test, which were operated with relief from symptoms and without the appearance of the opposite test on later occlusion to prove the result.

He mentions conservative treatment which to my mind is the resort of those afraid to do anything. Five years ago I operated on the son of a general in our army. The boy had been turned down for West Point because of a low hyperphoria. Behind cover he developed an exophoria of 12 and hyperphoria of 10. The weak superior rectus was shortened with a final test of orthophoria in both directions. His father succeeded in having a refractive error waived and the boy entered the academy graduating this year number five in his class. Was that conservative treatment? From a financial angle the operation saved the father at least ten thousand dollars.

Last, but not least, he is wrong in saying that the occluded eye always turns up. Very often it turns down or simply develops its total horizontal deviation.

As to convergence he is again wrong. Many who have a definite weakness are able to converge better probably due to the rest.

I am satisfied that the pad he used, by positively closing the eye, tends to push the eyeball upward.

It would appear that Abraham conceived his theory, looked for any point that would support it and ignored those that would not.

Beisbarth apparently favors the idea that the successful users of the test are wonderful psychologists being able to talk patients into wearing incorrect glasses for indefinite periods. This is very flattering to our personalities but, I must admit, another one of his errors.

In a paper "On Bell's Phenomenon" by Prof. Nagel, published in vol. XXX of the Archives of Ophthalmology, occurs the following statement: "It has been stated by various observers that Bell's Phenomenon does not take place when the lids are closed gently as in sleep but the phenomenon is well marked when the lids are pinched tightly together or pressure exerted on them. Even the touching of the closed lids with the finger increased the tendency of the ball to turn upward . . . but it is perhaps not generally known that pressure on the lids or even the presence of an occlusive bandage affects the position of the eyes."

The above quotation supports my idea that the eye is to be merely covered.

Possibly the fact that I have made the test in over 3000 people and would feel lost, were it not available, might be worth something.

In conclusion I want to insist that the test, when properly made, is merely a prolonged cover test. No pressure must be made on the eye. The eye must be kept covered till two tests taken on different days agree. At times as long as ten days are required.

And, above all things, once a diagnosis has been made have the courage to act accordingly.

Roderic O'Connor.

San Francisco

For the sake of brevity I will deal only with the essential points in Dr. O'Connor's letter. There is the suggestion that my tests were not made properly as to method and duration of occlusion.

The method of patching used agrees with the method described by the ardent supporters of this test who considered the gauze patch an improvement over Marlow's opaque lens. The patch prevented "peeking" and more surely produced occlusion and dissociation. Marlow himself gave support to this more effective method of producing dissociation by failure to criticise this point in his discussion of C. S. O'Brien's paper (Trans. Sec. on Ophth. A.M.A. 1925, p. 246).

The time of occlusion in my tests averaged twenty-three hours and in only five tests was the period of occlusion less than fifteen hours, never less than six hours. The supporters of the test used a shorter period of occlusion for practical reasons. O'Brien prescribed from two hours of occlusion. Marlow (Amer. Jour. Ophth., 1927) agrees that this short period is better than no occlusion though he indicated the results may in some cases be misleading. The important factor in making the test as emphasized by F. W. Marlow (Amer. Jour. Ophth., v. 4, p. 238, 1921) is that "... the test is made without any break in the continuity of occlusion." Complete dissociation of the two eyes is needed. This may account for the long period of occlusion found necessary by those using an opaque lens which cannot give *full* occlusion and really requires suppression.

As to the results of treatment and their explanation, what I said was that the results of treatment following occlusion were not easily explained *without a detailed study of the cases.* Such details as are needed are not easily obtainable in the literature. In the article by O'Connor (Diagnosis and Treatment of Vertical Deviations, Trans. Amer. Acad. of Ophthal. 1926), he presents one of the few cases in the literature which permits any analysis. In this case the *left* eye was occluded and five degrees of *left* hyperphoria were found where none existed before. A shortening of the right superior rectus was done with an *overcorrection* of nine degrees, found on the next day. On the fifth day after operation, the patient exercising the eyes and going without a patch, "only one-half degree" of overcorrection was present. The patch was then replaced (on the operated *right* eye presumably, for protection). The next morning "the *overeffect* was back" (*right hyperphoria*). Though it may possibly be unfair to take this case and argue that even here with the *left* eye covered a *left* hyperphoria was found and with the *right* eye covered, a *right* hyperphoria was found, it seems more than likely that the explanation of the findings in this case is in agreement with those I presented.

The issue here is not whether correction of hyperphoria is very helpful or not (in fact, I believe it is, at least for a time). The issue is not whether or not "results" are good or bad in the hands of any one doctor or any small group of doctors. Operative good results may be explained on innervational changes. In fact, in O'Connor's own opinion no definite relation in millimeters of shortening can be found between operation and defect. One must look farther. ". . . one often finds it as difficult to correct an invisible esophoria of 11 prism diopters as a squint of 45 degrees of arc" (from O'Connor's article, The Cinch Shortening Loop, etc. Pac. Coast Oto-Ophthalmological Society, 1930). There is a marked adjustability to the various conditions under which the eyes work. Variations in innervation occur throughout the day. Innervational imbalances as *found normally* are more important than those induced by interfering with normal associated activity and when found consistently, as by my modified duction test, correction can be expected to give relief in some cases for a considerable period. More and more, however I am led to believe in a fundamental instability of the vegetative nervous system as a basic factor.

Beisbarth, whose report confirmed my findings, presented data gathered in good faith, taken "before the idea had been entertained that the results of a prolonged occlusion test depended greatly upon which eye was occluded" (Amer. Jour. Ophth., v. 15, p. 1013, 1932).

If in a series of cases the test is done with an opaque *shell* over the occluded eye permitting free opening of the eye, if in another series the test is done as usual with the eyelids closed during occlusion, and if the data are fully and scientifically presented leaving out psychological effects and variations possibly due to adjustability of the body forces, then I would be willing to modify my conclusions as the results might indicate.

Samuel V. Abraham.

Los Angeles

Diagnostic significance of traumatic incarceration of the iris

A recent issue of this Journal (v. 15, no. 8, p. 685) contained an exceedingly instructive paper by Dr. Verhoeff on penetration of the eye by foreign bodies. In the course of his interesting and comprehensive presentment, this author noted the fact that incarceration of the iris in a penetrating corneal wound, and especially if there were a prolapse through it, was almost proof positive that there was no foreign body retained in the eye. It was an "astute observer," he adds, who first called attention to this diagnostic and practically important sign. I remember that this point was one of the first impressed upon me by my teacher and chief, the late Dr. Emil Gruening, many, many years ago when I was writing, with him, the article on Injuries of the Eye which appeared under his name in the Norris and Oliver "System." It was my first contribution to ophthalmological literature and when our work was published without mention of my name, I felt aggrieved. But that is, as Kipling says, another story. Dr. Gruening used to tell, very dramatically, how on the occasion of an early visit to "Moorfields"—it must have been in the early eighties as this was before I began the practice of medicine—he had saved an eye from being enucleated immediately after injury by penetrating wound, on the strength of iris prolapse, alone; and that his judgment has been confirmed by the subsequent course. As I wrote Dr. Verhoeff, I do not know whether Gruening was *the* astute observer he had in mind, but he was certainly *one of them* and maybe the earliest. Dr. Verhoeff wrote back: "I regret very much that I cannot recall who the 'acute observer' was but I feel sure that he was an American. Possibly he was not original in his observation. It might be interesting for you to send a note about the matter to be published in the American Journal of Ophthalmology." Hence these lines.

Percy Fridenberg.

New York City

History of Ophthalmology in Spain

While correcting proof of my correspondence "Notes on history of ophthalmology in Spain", I inserted the name of Dr. M. Menacho, the editor of the Archivos, after "Mejia", but it was unfortunately left out when the article appeared in print. I thought nothing of the matter, but I have just received from Dr. Menacho, without further comment, his visiting card which reads:

"Director y Redactor Jefe de Archivos de
Oftalmologia Hispano Americanos
Fundador de la Sdad. Oftalmologica Hisp. Amer."

I had intended by my correction in the proof to repair my original oversight. Dr. Menacho's reaction is of course justified, and I would like to undo this sin of omission. Please insert in the next issue the following correction:

"I regret that an unfortunate omission occurred in my correspondence 'Notes on history of ophthalmology in Spain', when referring to the establishment of the 'Sociedad Hispano-Americana de Oftalmologia', the official name of which is 'Sociedad Oftalmologica Hispano-Americana'. Mention should have been made of its founder, Doctor M. Menacho of Barcelona, who, together with Dr. J. Santos-Fernandez, also founded the Archivos de Oftalmologia Hispano-Americanos in 1901, and who is now the director and editor-in-chief of the Archivos."

M. Davidson.

New York City

ERRATUM

Through an error in printing the frontispiece in the January number of the Journal, after the editor had checked the proof of this plate in which the illustrations were in correct position, the lower cut was reversed and placed upside down. We deeply regret the mistake which was so obvious that we think that the text could be interpreted in the reversed representation.

ABSTRACT DEPARTMENT

EDITED BY DR. WILLIAM H. CRISP

Abstracts are classified under the divisions listed below, which broadly correspond to those formerly used in the Ophthalmic Year Book. It must be remembered that any given paper may belong to several divisions of ophthalmology, although here it is only mentioned in one. Not all of the headings will necessarily be found in any one issue of the Journal.

CLASSIFICATION

1. General methods of diagnosis
2. Therapeutics and operations
3. Physiologic optics, refraction, and color vision
4. Ocular movements
5. Conjunctiva
6. Cornea and sclera
7. Uveal tract, sympathetic disease, and aqueous humor
8. Glaucoma and ocular tension
9. Crystalline lens
10. Retina and vitreous
11. Optic nerve and toxic amblyopias
12. Visual tracts and centers
13. Eyeball and orbit
14. Eyelids and lacrimal apparatus
15. Tumors
16. Injuries
17. Systemic diseases and parasites
18. Hygiene, sociology, education, and history
19. Anatomy and embryology

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1. GENERAL METHODS OF DIAGNOSIS

Evans, J. N. **Slitlamp ophthalmoscopy.** Amer. Jour. Ophth., 1932, v. 15, Dec., pp. 1144-1147.

Pirie, A. H. **Reading with closed eyes.** Canad. Med. Assoc. Jour., 1932, v. 27, Nov., p. 488.

By the above title the author does not mean that it is possible to close one's eyes and read a newspaper, but that certain objects and sentences may be seen through the closed lids by means of x-ray stimulation of the retina. The method is simple. Dark adaptation for ten or fifteen minutes is essential. Small lead letters or perforations in a lead plate are placed in contact with the closed lid. The rays from an x-ray tube are thrown toward the retina. The shadow of the object placed before the eye is projected upon the retina and seen inverted. If the letters are about ⅛ of an inch, a short word can be read. By arranging lead letters on a ribbon to form a sentence, that sentence can be read by passing the words one after the other in front of the eye.

The practical applications of this method are that metallic foreign bodies can be localized by the patient, especially if a grid is placed before the eye. If the foreign body lies within the eye it can cast only one shadow. If the foreign body lies outside of the eye it may also cast only one shadow, but if two shadows are seen it is proof that the foreign body is outside of the eye. The field of vision can be mapped out by using the grid, and the patient can show by a diagram what he has seen. This is of value in cases of mature cataract or opacities of the cornea where the ordinary methods cannot be used. The fact that glass fluoresces under x-ray bombardment enables the ophthalmologist to see a piece of glass in the eye. If the observer is dark-adapted and a powerful beam of x-rays is passed into the eye he should be able to see the fluorescing piece of glass within the globe. M. E. Marcove.

2. THERAPEUTICS AND OPERATIONS

Bellavia, A. **The action of insulin in glaucoma, in asthenic corneal ulcer, and in lacrimal fistula.** Rassegna Ital. d'Ottal., 1932. v. 1, July-Aug., p. 490.

After a consideration of the action of insulin upon the body tissues in general, Bellavia reports his experience with the drug in glaucoma with hypertension, asthenic ulcer of the cornea, and lacrimal fistula. The four cases of

glaucoma showed an initial drop in tension, which remained unaffected by subsequent doses. In the corneal ulcers there was a definite improvement in cases which had resisted all other treatment, due no doubt to stimulation of the general body functions. An indolent lacrimal fistula healed quite promptly, a fact explained by the author as due to accelerated trophic influences.

Eugene M. Blake.

Eggston, A. A. **The use of tuberculin in diagnosis and treatment in ophthalmology.** Arch. of Ophth., 1932, v. 8, Nov., pp. 671-682.

The use of tuberculin for diagnosis is becoming more and more frequent, but the treatment of tuberculous lesions with tuberculin has practically disappeared, except in ophthalmology. The reasons for these facts are considered in this paper. The author concludes that tuberculin is contraindicated in lesions due to infection by tubercle bacilli, but is of benefit in the allergic reactions secondary to such infection. The majority of ocular lesions are of such an allergic nature, while actual tuberculous infection of the eye is relatively rare. On this account, the use of tuberculin is of more than usual value in ophthalmology, the injections desensitizing the patient. (Discussion.) M. H. Post.

Gallenga, R. **Later researches concerning absorption through the cornea.** Rassegna Ital. d'Ottal., 1932, v. 1, July-Aug., p. 555. (See Section 6, Cornea and sclera.)

Grolman, G. **Medical and surgical diathermy in ophthalmology.** Arch. de Oft. de Buenos Aires, 1932, v. 7, Jan., p. 43, and Feb., p. 94.

This paper contains a preface, a history of diathermy in general and in ophthalmology, and a description of the different types of circuit used for this kind of physiotherapy.

R. Castroviejo.

Pergola, A. **The value of pantocain as an ocular anesthetic.** Rassegna Ital. d'Ottal., 1932, v. 1, July-Aug., p. 437,

Pergola tested the recent local anesthetic, pantocaine, clinically and experimentally, and found it superior to cocaine, and percaine. Its action, in two per cent solution, is more prompt and efficacious, it is less toxic, does not affect the pupil or accommodation, nor does it affect the corneal epithelium or ocular tension. The author recommends a two per cent solution, with the addition of adrenalin, for infiltration.

Eugene M. Blake.

Poos, G. H. **Present status of diathermy in ophthalmology.** Amer. Jour. Ophth., 1932, v. 15, Dec., pp. 1150-1156.

Sala, G. **Pharmacological studies of the action of harmine on the eye.** Ann. di Ottal., 1932, v. 39, June, p. 261.

Harmine is an alkaloid having the formula $C_{13}H_{12}N_2O$ obtained from a plant known as Banisteria Caapi. It has been given in Parkinsonian syndromes with some good results. Instilled in one percent solution into the conjunctival sac, it produces intense anesthesia of the superficial conjunctiva rather than of the cornea. It induces an increase of circulation in the conjunctival vessels, with chemosis of the bulbar conjunctiva. The retinal blood vessels are not influenced by retrobulbar administration. The tension of the eye, the index of refraction of the aqueous, and the albuminoid content of the aqueous were not modified by administration of the drug in various ways.

H. D. Scarney.

Terson, A. **A powerful pinch-scissors.** Ann. d'Ocul., 1932, v. 169, Nov., pp. 883-884.

This instrument follows the design of the de Wecker scissors. It is of such size and construction as to be suitable for cutting firm tissues such as tendon and other gross parts about the eye.

H. Rommel Hildreth.

Town, A. E., and Frisbee, F. C. **Bacteriophage in ophthalmology: a preliminary report.** Arch. of Ophth., 1932, v. 8, Nov., pp. 683-689.

In 1916 d'Herelle gave the name bacteriophage to an agent causing dissolution of a bacterial cell, and encountered in cultures from a convalescent pa-

tient having bacillary dysentery. Bacteriophages have been found specific for many strains of bacteria, and many others are supposed to exist. This substance is specific in action, and can be applied topically or injected locally into lesions of the lids. Systemic reactions have not been observed.

Twenty cases have been treated by the author. Dacryocystitis, abscess, hordeolum, meibomitis, ulcer of the cornea, and an infected skin graft were among these. M. H. Post.

3. PHYSIOLOGIC OPTICS, REFRACTION, AND COLOR VISION

Mayer, L. L. **Precision cross cylinder.** Amer. Jour. Ophth., 1932, v. 15, Dec., p. 1168.

Ponthus P. **Subjective determination of the principal meridian of the astigmatic eye by the "staircase phenomenon" of Dr. Chanoz.** Arch. d'Opht., 1932, v. 49, Oct., p. 644.

In astigmatic eyes there exists an unequal brightness of the images of straight lines according to their relation to the principal meridian of astigmatism. Also circles of diffusion may produce shadows at the acute intersection of lines which are not in the principal meridian. These two facts form the basis of the test.

The apparatus of Chanoz consists of six concentric black circles, each one centimeter wide, and separated by spaces one centimeter in width, upon a white background. A straight black line extends through these circles as a diameter and may be rotated so as to occupy any desired meridian. A scale surrounding the outermost circle is graduated in degrees and determines the position of the diametric line.

When this line is rotated into the least ametropic meridian it appears gray but undeformed. In the more ametropic meridian it appears sharp and black, and also undeformed. In any intermediate meridian the angle formed by the line with the circles shows a v-shaped shadow, producing a staircase effect, and the lines forming the circles appear more luminous or distinct in the meridian perpendicular to the maximum curvature.

Photographs illustrate the appearance of the chart with the line in the various positions described above. With this chart the diagnosis and axis of astigmatism may be determined. It is necessary to resort to the trial case to determine if the astigmatism is myopic or hyperopic and to define its exact dioptric measurement. The astigmatism is corrected when a cylinder is found, which renders it impossible to produce the above phenomenon with the chart. All these examinations were conducted in white light, but the results of investigation with colored light will be published shortly. M. F. Weyman.

Rischard, M. **Accommodation of the eyes of birds.** Ann. d'Ocul., 1932, v. 169, Oct., pp. 795-801.

In repose the bird eye is adapted for near vision. A moving distant object stimulates attention, activates the nerve of accommodation. The cornea is flattened by contraction of the muscle of Crampton, the lens flattens, and the pupil dilates. The iris is a single-muscle structure and is not made up of separate dilator and sphincter musculatures.

H. Rommel Hildreth.

Rugg-Gunn, A. **Contact glasses.** Ophth. Soc. United Kingdom, 1931, v. 51, pp. 477-484. (See Amer. Jour. Ophth., 1932, v. 15, Feb., p. 166.)

4. OCULAR MOVEMENTS

Carroll, F. D., and Blake, E. M. **Repair following operations on the extraocular muscles: histologic observations.** Arch. of Ophth., 1932, v. 8, Nov., pp. 711-726.

Carroll and Blake here report experimental work done on rabbits in order to determine the postoperative course of the various operations on the extraocular muscles. Seventeen simple tenotomies, sixteen attachments with sutures, eight tuckings, and twelve resections were performed, and the animals were killed at intervals of from two to forty days. After simple tenotomy the attachment of the muscle varied greatly, dependent upon whether the blood clot held the muscle firmly against the sclera during the first few days until new connective tissue had

formed, or whether merely a loose attachment to episcleral tissue had taken place. In one case the muscle was discovered back of the globe, entirely unattached. In all seventeen cases with sutures, either plain or chromic catgut, or silk, the union was firm after the tenth day. The experiments were inconclusive with regard to the advisability of the use of chromic catgut. In tucking and resection, the end result depends upon a bridge of strong connective tissue uniting the loops of the tuck, or the severed parts of the muscle. Occasionally the muscle becomes attached at some distance from the desired point. M. H. Post.

Chavasse, Bernard. **An examination of existing theories of concomitant convergent strabismus, together with some observations on the antiquity of stereopsis.** Trans. Ophth. Soc. United Kingdom, v. 50, pp. 168-181.

Concomitant strabismus is discussed from the standpoint of the extraocular muscles, accommodation, and fusion faculty. The power of full muscular excursion does not preclude the possibility of weakness, nor does clinical concomitance exclude paresis. With increasing accuracy of diagnosis muscular weakness and low degrees of paresis will account for a larger percentage of cases. The fusion-faculty theory is dismissed as being unsound and obscure, while the accommodation theory fails to explain convergent strabismus in low degrees of hypermetropia, in myopia, and in ocular inequality. The author avers that binocular stereoscopic vision is not a primatial perquisite.

Harold F. Whalman.

Collier, James. **Oculomotor palsies resulting from infective and toxic processes.** Trans. Ophth. Soc. United Kingdom, v. 50, pp. 244-252.

Ocular palsies may occur from infective and toxic processes such as diphtheria, polyneuritis, botulism and veronal intoxication, or with myasthenia gravis. Four types are discussed: (1) peripheral paralysis involving one or more branches of the oculomotor nerve; (2) supranuclear paralysis of associated movements of the eye; (3) nuclear paralysis, characterized by irregularity, diplopia, loss of parallelism, nystagmus; (4) isolated paralysis due to specific selective activity, such as paralysis of the ciliary muscle in diphtheria or syphilis.

In diphtheric polyneuritis the author observed, in addition to the usual ciliary paralysis, third and sixth nerve paralysis on one or both sides, and also nuclear ophthalmoplegia, but never loss of the light reflex. He has seen such cases of ophthalmoplegia following tetanus from orbital wounds. Veronal poisoning and the veronal habit may produce the irregular nuclear type, even to complete external ocular paralysis. These cases must be differentiated from tumors of the midbrain. Luminal acts similarly. Myasthenia gravis is usually of the nuclear type, occasionally peripheral, and ocular signs may be early in the disease.

Harold F. Whalman

Fox, J. C. **Disorders of optic nystagmus due to cerebral tumors.** Arch. Neurol. and Psychiat., 1932, v. 28, Nov., p. 1007.

This is a detailed study of twelve cases with verified lesions variously located in the cerebral hemispheres. A nystagmograph photographed horizontal, conjugate deviations of the closed eye.

Disturbance of optic nystagmus was demonstrated in seven of the cases; and in all of these cases except two the lesions were located in the posterior part of the hemisphere, in the temporal and parieto-occipital region behind the supramarginal gyrus. In those cases, except one in which optic nystagmus was unaffected, the lesions were situated in the anterior part of the brain, in the frontal or parietal region. Nystagmus was not affected by either of two lesions situated in the upper midportion of the hemisphere but in each of these instances the pathological process was confined to the surface of the brain. The rationale of disorders of optic nystagmus is discussed.

M. E. Marcove.

Jameson, P. C. **Some essentials and securities which stabilize operations on ocular muscles.** Arch. of Ophth., 1932, v. 8, Nov., pp. 654-670.

The author pleads for more rational selection of operation in the various types of squint. Those cases showing greater degrees of esotropia for near than for far indicate excessive action of the interni, while those showing an equal amount, with a relatively distant convergence near point, indicate weakness of the interni. The former do well following recession, while in the latter it is distinctly contraindicated. Where the two procedures are to be combined, the ratio, as a rule, should be 1 mm. of recession to 2 mm. of advancement. The author discusses the value of various details. The paper is chiefly a review of former work. M. H. Post.

Marquez, M. **Ocular movements of direction and convergence.** Ann. d'Ocul., 1932, v. 169, Oct., pp. 769-776.

Two sorts of movement are distinguished, that in which the eyes turn to throw the image on the fovea; and that in which the visual axes converge on the fixation object. The first function is primitive, being found in lower forms with lateral eyes, while the second more recently developed is found only in higher forms, and is more easily disturbed. H. Rommel Hildreth.

Marquez, M. **Parallel ocular movements and convergence.** Arch. de Oft. Hisp.-Amer., 1932, v. 32, Oct., p. 533.

From the fact that an eye which begins to diverge when reaching the limit of convergence is capable of further adduction when a parallel movement in opposite direction is demanded of it, the writer argues for separate existence of central pathways for parallel and convergence movements. By means of a diagram, with cyclopic eye as center of rotation, the angle of convergence, outside of the sagittal plane, is shown to grow smaller and finally to disappear at the theoretical rotation of 90 degrees. All binocular movements away from the sagittal plane are therefore the results of varying combinations of parallel and convergence impulses. Thus is explained the preference of some persons for binocular fixation outside of the sagittal plane. M. Davidson.

Oneto, J. A. **A case of paralysis of associated movements of the eyeballs.** Boletin de Informacion Oft., 1932, 5th yr., March-April, pp. 97-100.

The author discusses the anatomic bases of two types of paralysis of associated movements of the eyeballs, (1) paralysis of voluntary movements with conservation of the movements of gaze and (2) complete paralysis of associated movements of the eyes. An elderly woman came with the statement that the eyes had started to jump and that she could not raise them. The fundi were normal, the pupils fixed and dilated. The patient could not look down nor converge, but she could look toward the right or left or upward. The neurological examination was negative. The lesion was diagnosed as being in the posterior commissure and the region of the quadrigeminate bodies.
W. H. Crisp.

Parker, F. C. **The Todd muscle tuck with a modification.** Arch. of Ophth., 1932, v. 8, Nov., pp. 727-732.

This paper reviews the muscle-tucking operation, suggests a few changes, which to the author's mind improve the result, and points out a few of the errors which lead to an unsatisfactory outcome. M. H. Post.

Roche, W. J. **The etiology of miners' nystagmus.** The Practitioner, 1932, v. 129, Oct., p. 498.

Insufficient illumination under ground is regarded as the major causative factor in this disease. Men who are intemperate, in poor health, or of a nervous disposition are most likely to be affected. The average age of those affected was forty-four years. The ideal lamp is the cap lamp, which should be of at least six-candle power. There should be a covered-in passage on the way from the cage to the lamp room, so that the men would gradually become light-adapted on ascending from the pit. M. E. Marcove.

5. CONJUNCTIVA

Bengtson, Ida A. **Etiology of trachoma with reference to relationship of Bacterium granulosis** (Noguchi) to the disease. Public Health Reports, 1932, v. 47, Sept., p. 1914.

This detailed, very complete review of the literature bearing on the isolation of Bacterium granulosis from trachoma in various parts of the world shows a wide variation in results. In human inoculations the results as described in the literature have for the most part been negative or doubtfully positive. But the finding of Bacterium granulosis in certain sections of this country and perhaps in other parts of the world merits its consideration as an etiological factor in trachoma. It has been possible with this organism to produce in Macacus rhesus monkeys a granular condition which may correspond with human trachoma and which is easily transmissible from animal to animal. On the other hand, there is a possibility that in certain localities the organism is not present and is therefore not the etiological factor in disease. (Forty-five references.) Ralph W. Danielson.

Bistis, J. **Treatment of pterygium by scleropexia.** Ann. d'Ocul., 1932, v. 169, Nov., pp. 908-909.

The author transplants the head upward after the method of Desmarres. The body is then sutured to the sclera in one or two places.

H. Rommel Hildreth.

Casini, F. **Vernal conjunctivitis and seasonal modification of the eosinophiles.** Arch. di Ottal., 1932, v. 39, May, p. 241.

The behavior of the eosinophiles in six cases of vernal conjunctivitis did not demonstrate any modification of note as between investigation of the blood findings in the winter when the disease was latent and during the spring when the disease was actively present. Eosinophilia in these persons was not dependent on the intensity of the morbid process. The action of ultraviolet rays on these patients was manifested by an increase of the lymphocytes at the expense of the polymorphonuclears, while the eosinophiles remained unaltered. H. D. Scarney.

Gallenga, R. **The natural immunity of the conjunctiva in relation to the blocking of the reticulo-endothelial system with trypan blue.** Arch. di. Ottal., 1932, v. 39, March, p. 122, and Aug., p. 411.

By intravenous injection of one per cent trypan blue the author was successful in rendering the rabbit conjunctiva sensitive to pneumococcic infections. Five c.c. of the solution was injected on alternate days until 35 c.c. had been given. Twenty-four hours after the last injection, a fresh broth culture of pneumococcus was instilled in the conjunctival sac. Controls showed no conjunctivitis, whereas animals that had received trypan blue showed definite conjunctivitis.

The author discusses the question whether the sensitivity was dependent upon functional paralysis of the reticulo-endothelial system or upon toxic action of the trypan blue. He found that the conjunctivas of guinea pigs and white rats were not rendered sensitive to pneumococci by this method, although the organism could be recovered from the sacs. He concludes that the diminution of resistance of the rabbit conjunctiva against pneumococci was due to a general toxic basis which was lacking in the rats and guinea pigs.

H. D. Scarney.

Giani, P. **The virulence of the staphylococcus isolated from cases of conjunctivitis.** Rassegna Ital. d'Ottal., 1932, v. 1, July-Aug., p. 532.

Giani determined the presence of the staphylococcus in the various forms of conjunctivitis—acute, chronic, and angular. In fifty-two cases he found the organism present in 65 per cent. It was most frequently present in angular conjunctivitis, less in chronic conjunctivitis, and still less in the acute catarrhal form. Pathogenicity was found to be in the same order as the frequency with which it was found in different types.

Eugene M. Blake.

Greig, D. M. **Recurrent bleeding from the eyes.** Edinburgh Med. Jour., 1932, v. 39, Oct., p. 628.

Recurrent bleeding from the eyes has been known from time immemorial, and the author cites cases in the literature extending back to 1521. It is much more common in women than in men and usually accompanies menstruation. The loss of blood is usually from the conjunctiva and caruncle and is seldom in any large quantity. The author believes that the instability of the nervous system at the menstrual period is to blame rather than the local utero-ovarian changes. M. E. Marcove.

Hall, D. G., Jr. **Some studies on the ... eye gnat Hippelates pusio (Loew).** Amer. Jour. of Hygiene, 1932, v. 16, Nov., p. 854.

This is a very interesting and detailed study of the life history of the eye gnat, Hippelates pusio Loew. These insects abound in great numbers in the Coachella valley of Southern California. During the spring and autumn, they are attracted in large numbers to the eyes and natural orifices of man and other animals. They feed upon these openings as well as upon exudates of sores, bruises, and similar lesions. Cases of conjunctivitis have become numerous among the residents of this valley, children of preschool age being particularly affected.

M. E. Marcove.

Lijo Pavia, J. **Beneficial action of tuberculin in Parinaud's conjunctivitis.** Rev., Oto-Neuro-Oftal., 1932, v. 7, May, p. 218.

Three cases in which the author employed tuberculin are reported in detail. The condition cleared in unusually short time, and the author concludes that the condition is essentially one of allergy, dependent in some manner on the presence of tuberculosis. Biopsy and inoculation into guinea-pigs showed absense of tuberculosis. A. G. Wilde.

Michaïl, D. **Rhinogenic bilateral hyperplastic inflammation of the semilunar fold.** Ann. d'Ocul., 1932, v. 169, Oct., pp. 777-784.

An eighteen-year-old boy suffered with chronic mucopurulent rhinitis, adenoids, and suppurating middle ear disease. For a year there developed a hyperplastic inflammation of both semilunar folds, with photophobia and other symptoms. The basal metabolic rate was elevated to plus twenty and there was hypertonus of the sympathetic nervous system. The condition was relieved by antiseptic treatment of the eyes and nose.

H. Rommel Hildreth.

Ruata, V. **The importance of secondary infection in trachoma and its treatment by vaccine.** Rassegna Ital. d'Ottal., 1932, v. 1, July-Aug., p. 437.

Vaccine therapy in trachoma and the other ocular infections. Ann. di Ottal., 1932, v. 60, April-May, p. 327.

Ruata believes that pure trachoma is a benign morbid syndrome, of doubtful contagiousness, affecting principally infants and dependent upon a constitutional state. The active, florid trachoma of adults, with its complications, is in great part a reactivation of the infantile form by a superimposed bacterial infection. To combat the latter condition the author has prepared a vaccine, which is not antitrachomatous, but is intended to counteract the secondary infection. He calls this a "polyvalent stock antibacterial vaccine". Fifty-two cases of severe trachomatous complications were successfully treated. The dose varies from 50 million up to 250 million bacteria, is injected subconjunctivally every two days. In addition, the vaccine is brushed over the conjunctiva daily. The improvement appears to be rapid and the treatment harmless.

Eugene M. Blake.
Park Lewis.

Wright, A. D. **Method of treating gonococcal ophthalmia in the adult.** Trans. Ophth. Soc. United Kingdom, 1931, v. 51, pp. 42-48.

Blepharospasm and edema tend to hold infected material in direct contact with the cornea as well as prevent proper irrigation or treatment. It is suggested that the blepharospasm be overcome by paralyzing the facial

nerve, or the branch involved, by injection of ten percent novocaine. Flushing of the eye sac is accomplished by means of a tube carried in a trephine opening through the upper lid into the cul-de-sac. In discussion, Lindsay Rea advised magnesium sulphate solution 1 in 10, and avoidance of any cutting operation. J. G. Kinney.

6. CORNEA AND SCLERA

Chou, C. H. **Familial degeneration of the cornea.** Chinese Med. Jour., 1932, v. 46, Aug., p. 777.

Chou divides this condition into three main groups: (1) Groenouw's nodular keratitis, characterized by the presence of minute opacities in the central area of the cornea; (2) the Haab-Dimmer type, characterized by the formation of a meshwork of opacities; (3) the condition studied by Fleischer in 1905, and characterized by little ring-shaped opacities occupying the most central portion of the cornea.

Chou reports three cases of the Groenouw type and four of the Fleischer type. Some of the cases showed reduced corneal sensibility. Pathological examination of a trephined piece from one of the Groenouw group showed transformation of the superficial lamellae of the cornea into a homogeneous substance, probably hyaline. The pathogenicity of the disease may result from disturbance of corneal metabolism. Seventeen figures and eighteen references.

Ralph W. Danielson

Doggart, J. H. **Epithelial dystrophy of the cornea.** Trans. Ophth. Soc. United Kingdom, 1931, v. 51, pp. 52-62.

The article contains an abstract of the literature, reports of five illustrative cases, and a general clinical description of this disease of the cornea, with a plate and illustrations of endothelial detail. The salient features may be tabulated as follows: (1) Affects elderly females chiefly. (2) Gradual, progressive failure of vision. (3) Hourly and daily fluctuation of symptoms. (4) Process involves Descemet's membrane, epithelium, and substantia propria in the order given. (5) Tends to become bilateral. (6) Abolition of corneal sensation. (7) Unknown etiology. (8) No known cure. Late observers have noted the presence of a bronzing of the posterior corneal surface, thought to be due to alterations in the endothelial cells, with a loss of the normal mosaic pattern. The epithelial changes, such as vacuolization, edema of outer cell layers, and loose or frayed corneal surface, may be detected by other means, but the corneal microscope clinches the diagnosis by means of the detailed pictures. In discussion, Mr. Treacher Collins thought the disease might ultimately be called "endothelial dystrophy", because the primary change seemed to be a degeneration of the corneal endothelium. (Extensive bibliography.)

J. G. Kinney.

Freudenthal, E. **Two cases of familial endothelial dystrophy of the cornea with general degenerative changes.** Zeit. f. Augenh., 1932, v. 78, Sept., p. 224.

Endothelial dystrophy was unknown before the advent of the slitlamp and only a few cases of dystrophy limited to the endothelium have been described. The author observed two patients, father aged forty-two, and son aged fourteen years, who had dystrophy of the corneal endothelium. The lesions were identical in both patients. The epithelium and Bowman's membrane were normal. In the anterior corneal lamellae delicate nebulae were seen. The posterior surface of the cornea was very rough and in many spots the endothelium was greatly swollen, while in narrow contiguous zones the endothelium was vesicular. With lower magnification these areas looked like sharply circumscribed deposits on Descemet's membrane, of a peculiar yellowish white color. These lesions are uniformly distributed over both corneas. The visual acuity was reduced. The son also had myopic astigmatism, divergent strabismus, and a moderate degree of cretinism. The father had myopic astigmatism, divergent strabismus, and general debility probably resulting from a thyroid-hypophyseal

dysfunction. A younger son was normal generally and has normal eyes. The wife of the man had dementia praecox, his sister a syphilitic lesion of the cornea, and her son normal corneas and hyperthyroidism.

F. Herbert Haessler.

Gallenga, R. **Later researches concerning absorption through the cornea.** Rassegna Ital. d'Ottal., 1932, v. 1, July-Aug., p. 555.

Gallenga reports upon further experiments with regard to the absorption of chemical substances through the cornea. Using an isotonic solution of the iodid of potassium, he reaches the conclusion that absorption is regulated by osmotic pressure and that the cornea comports itself as a permeable membrane through which diffusion occurs.

Eugene M. Blake.

Greeves, R. A. **X-ray applications in superficial keratitis.** Trans. Ophth. Soc. United Kingdom, v. 50, pp. 111-117.

The author has used x-rays for treatment of superficial corneal lesions which were resistant to other forms of treatment. One-third of an erythema dose was given, repeating not sooner than after two weeks. Fourteen cases of acne rosacea corneae were treated, most of them of long standing but a few of recent origin. The latter remained quiet for a considerable time after one application, while the cases of longer standing required two or three treatments. Ten cases of recurrent corneal abrasion were checked, with one exception, after one to six applications. The Coolidge tube is placed with the kathode 23 cm. from the cornea, using a 1 mm. aluminum filter, and a spark gap of eleven inches, and directing the rays through a lead glass applicator of 1.5 to 2 cm.

Harold F. Whalman.

Marx, E. **Researches upon the sensitivity of the cornea.** Arch. d'Opht., 1932, v. 49, Oct., p. 651.

Sixty-six normal corneas were tested as to sensitivity with the apparatus of Frey. Hairs with a pressure of 5, 25, 50, 75, 100, 150, and 200 mg. were used, each hair being applied to every cornea in thirty-three different spots according to a diagram which accompanies the article. The curve of averages shows that slightly above 200 mg. of pressure would be felt in all thirty-three spots in every cornea. A cornea reacting to 25 mg. of pressure was found to be only 2.8 times more sensitive than one reacting to 200 mg. of pressure and not eight times more sensitive as is apparently the case. Similar experiments were carried out upon eyes with corneal scars, iridocyclitis, glaucoma, interstitial keratitis, and corneal herpes. All these conditions reduced corneal sensitivity, the greatest reduction occurring in herpes.

M. F. Weymann.

Samuels, Bernard. **Methods of formation of the posterior abscess in ulcus serpens.** Ophth. Soc. United Kingdom, 1931, v. 51, pp. 485-495. (See Amer. Jour. Ophth., 1932, v. 15, May, p. 459.)

Thomas, J. W. T. **Experimental transplantation of cornea in a rabbit to replace a central corneal opacity.** Trans. Ophth. Soc. United Kingdom, 1931, v. 51, pp. 88-95.

Following previous work on the best method of corneal grafting, the author employed his cross stitching procedure and grafted clear cornea in place of a central leucoma. Plates and a good description of the gross appearance follow the progress of the experiment. The author concludes that by such an operation the eye may be given useful vision and an almost clear central graft of full thickness. J. G. Kinney.

Thomas, J. W. T. **Three corneal grafts in rabbits illustrating the effect of an adherent iris.** Trans. Ophth. Soc. United Kingdom, 1931, v. 51, pp. 96-102.

The effect of adherent iris in the corneal grafting operation was illustrated and the rabbits shown 11, 17, and 19 months respectively after operation. Mr. Thomas concluded that clarity of the grafts was directly associated with the extent of the iris adhesions. In dis-

cussion the possibility of applying corneal graft operations to man, the technique of the operation, and after care were dealt with; and a preliminary report on a case of corneal grafting in a man of 22 years was given.

J. G. Kinney.

Thomas, J. W. T. **Transplantation of cornea: a preliminary report on a series of experiments on rabbits, together with a demonstration of four rabbits with clear corneal grafts.** Trans. Ophth. Soc. United Kingdom, v. 50, pp. 127-141.

A series of seventy-eight experimental transplants are reported, including many different types of operation. Fifty grafts remained attached and healed; twenty-eight did not take. Greater success was obtained by a cross-stitching method than by any other operative procedure. Great care must be exercised in manipulating the grafts, which should be cut round and in a shelving manner to insure coaptation without corners which detach and protrude. The graft is cut slightly smaller than the gap to be filled, to prevent protrusion. The author has not attempted any transplants on the human cornea.

Harold F. Whalman.

Usher, C. H. **Colored areas in the sclerotic.** Brit. Jour. Ophth., 1932, v. 16, Nov., p. 671.

This contribution reviews the literature of the subject. During the period from 1910 to 1925, the author observed nine cases, six of which he was recently able to reëxamine. Two showed no change in appearance. Two showed changes, one in color and the other in size of area involved. In the other two there was not sufficient evidence to warrant a statement. (One illustration.) D. F. Harbridge.

7. UVEAL TRACT, SYMPATHETIC DISEASE, AND AQUEOUS HUMOR

Crigler, L. W. **Subchoroidal hemorrhage diagnosed as sarcoma of the choroid.** Arch. of Ophth., 1932, v. 8, Nov., pp. 690-693.

The author reports in detail a subchoroidal hemorrhage diagnosed as sarcoma of the choroid, in which the true condition was determined on microscopic study. Very extensive and repeated hemorrhage followed enucleation, but was finally controlled. A few similar cases have been reported in the literature. M. H. Post.

Dimissianos, B. **Secondary lipoid degeneration of the anterior chamber of the eye (xanthomatosis bulbi).** Ann. d'Ocul., 1932, v. 160, Nov., pp. 894-907.

An eye presenting absolute glaucoma of two years' standing was removed from a forty-five-year-old woman. An orange coloration of the cornea was seen on close examination to be caused by masses in the anterior chamber which were lipoid in character when studied microscopically. The local eye changes are explained on a hemorrhagic basis, hyphemia and hemorrhagic glaucoma. Beside cholesteremia and an ocular lesion it appears that there is a local predisposition favoring lipoid degeneration. H. Rommel Hildreth.

Fuchs, A. **Sympathetic ophthalmia.** Arch. de Oft. de Buenos Aires, 1932, v. 7, Feb., p. 67.

The findings from microscopic study of a hundred eyes with sympathetic ophthalmia are presented. The author calls attention to the high percentage of cases of sympathetic ophthalmia after operations (thirty-one percent). The other cases are due to traumatism (sixty-five percent), penetrating ulcers (three percent), acid burns (two percent), and intraocular sarcoma (two percent).

A case is reported in which an injured eye was enucleated six days after the traumatism, but sympathetic ophthalmia developed in the other eye seven months later. The inflammation subsided under treatment. The laboratory findings in the enucleated eye showed a large infiltration of lymphocytes and epithelioid cells within and in the walls of the vessels of the uveal tract. In treatment, the importance of intensive fever treatment is stressed, beginning with typhoid vaccine and continuing with inoculations of malaria if necessary. R. Castroviejo

Redslob, E., and Gery, L. **Ocular findings in Gaucher's disease.** Ann. d'Ocul., 1932, v. 169, Nov., pp. 865-875.

This disease, an affection of the reticulo-endothelial system with splenomegaly, leucopenia, and hemorrhages, ending fatally, has never been known to show clinical eye changes. A case is reported with photomicrographs showing infiltration of the posterior choroid with Gaucher cells. The avascular structures of the eye show no evidence of the disease.

H. Rommel Hildreth.

Sgrosso, S. **Postoperative sympathetic ophthalmia.** Arch. di Ottal., 1932, v. 39, June, p. 284, and July, p. 309.

The author concludes that the sympathetic ophthalmia in the sympathizing eye consisted in two cases of a plastic uveitis and in a third case of an optic neuritis. It is not always possible to demonstrate after operation the presence of complicating factors (defects of technique, inclusion of the iris or of the capsule).

In the cases of postoperative sympathetic ophthalmia, timely intervention in the operated eye in the uveitic forms does not always arrest an analogous process in the uvea of the other eye. Even in cases of postoperative sympathetic ophthalmia there are not always bases for determining the point of departure of the sympathetic inflammation.

H. D. Scarney.

8. GLAUCOMA AND OCULAR TENSION

Berliner, M. L., and Nonidez, J. F. **Transportation of particulate matter from the vitreous into the optic nerve.** Arch. of Ophth., 1932, v. 8, Nov., pp. 695-710.

India ink injected into the vitreous did not migrate of itself either into the optic nerve or into the retina, but was carried by histocytes along the perivascular sheaths of the vessels of the optic nerve into the vitreous chamber, and thence through the same channels, ultimately being deposited in the pia and dura, and to some extent in the orbital tissues. It never appeared, either intra- or extracellularly, between the nerve fiber bundles or in the tissues of the retina. The authors' findings differed from those of other recent authors in that the india ink did not pass directly into the perivascular spaces and was not found in the retina. Particulate staining is adaptable to a study of the lymph flow.

M. H. Post.

Curran, E. J. **Some aspects in the etiology and treatment of acute and chronic glaucoma.** Jour. Oklahoma State Med. Assoc., 1932, v. 25, Sept., p. 287.

Curran believes that glaucoma is caused by obstruction of aqueous flow from the posterior to the anterior chamber. Hence he proposes a new type of iridotomy which he claims is effective in a large percentage of cases. He describes the technique in detail.

If an eye under very high intraocular pressure for a long period is reduced by operation 20 or 30 mm. of mercury and still is 10 or 15 mm. above normal, and has improved or remained the same in vision and field, Curran questions whether it is justifiable to submit the patient to another operation in order to bring the intraocular pressure to normal. He feels that the nerve fibers which have withstood the higher intraocular pressure are capable of functioning indefinitely under the lower pressure. But the eye should be under close observation. (Six case reports.)

Ralph W. Danielson.

De Grosz, Emile. **The indications for cyclodialysis from a thousand operations.** Arch. d'Opht., 1932, v. 49, Oct., p. 625.

An analysis of operations for glaucoma practiced at the First Eye Clinic of the Royal Hungarian University of Budapest since 1914 yields the following results. Of 649 trephine operations 83 percent have proved efficacious. Over one thousand cyclodialysis operations have been performed. In 87.7 percent of cases of chronic inflammatory glaucoma the immediate result was favorable in that the tension returned to normal. Three hundred cases were followed as to late results. Of these, 62 percent remained favorable at

the end of one year, 54 percent at the end of two years, and 50 percent at the end of five years. Although the immediate good result obtained by cyclodialysis may not prove permanent, this operation is capable of being repeated and may be used in combination with other operations for glaucoma. Operative and postoperative complications of cyclodialysis are rare. In one thousand cases no case of infection or sympathetic ophthalmia was observed.

At the Budapest clinic iridectomy is chosen in inflammatory glaucoma in the prodromal and acute stages, cyclodialysis and trephining (in order of preference) in chronic inflammatory glaucoma, the sclero-iridectomy of Lagrange for simple glaucoma, the anterior sclerotomy of Wecker for juvenile glaucoma, and enucleation is practiced in the degenerative stage of glaucoma.

M. F. Weymann.

Federici, E. **The Elliot method of operation in some forms of secondary glaucoma.** Arch. di Ottal., 1932, v. 39, Aug., p. 382.

After a critical exposition of the surgical treatment adopted in various forms of secondary glaucoma, the author devotes space especially to the operative cure of secondary glaucoma in large adherent leucomas and in luxation and subluxation of the crystalline lens. He demonstrates the advantages that one can gain in these cases with the Elliot technique as contrasted with anterior sclerectomy. (Case reports and bibliography.) H. D. Scarney.

Ferrari, A. **Primary glaucoma and mean resistance of the blood cells.** Arch. di Ottal., 1932, v. 39, April, p. 147.

The author discusses the facts concerning the pathogenesis of glaucoma, particularly the physiochemistry and the morphophysiology of the intraocular fluids and the blood. He undertook to study the resistance of the blood cells by using Ringer's solution of different percentages on fifteen glaucoma cases and fifteen individuals who were considered normal. He concludes: (1) The resistance of the blood cells does not show any difference between glaucomatous and normal individuals. (2) The blood cells are not modified in any form of primary glaucoma. (3) They are not related to intraocular tension, blood pressure, or the age or sex of the patient. (Bibliography.)

H. D. Scarney.

Friedman, Benjamin. **A new method of registering graphically the ocular pulse.** Arch. of Ophth., 1932, v. 8, Nov., pp. 733-737.

The intraocular pulse is recorded by taking a motion picture of the oscillation of the Schiötz tonometer pointer as the instrument is held in contact with the globe. The pointer is elongated slightly, in order that its movements may be recorded against a special scale placed just above the ordinary scale of the instrument. The pictures are taken sixty-four frames per second. The distance of the pointer tip from the nearest line on this special scale is then accurately measured on each frame and the measurements plotted to present a pulsation curve.

M. H. Post.

Onken, T. **An affection of the optic nerve with peculiar vascular involvement and secondary glaucoma.** Zeit., f. Augenh., 1932, v. 78, Oct., p. 329. (See Section 11, Optic nerve and toxic amblyopias.)

Quaglio, C. **The acuity of indirect vision in chronic simple glaucoma.** Ann. di Ottal., 1932, v. 60, April-May, p. 301.

Of nineteen eyes having glaucoma simplex three only had normal acuity of central vision, vision in the others varying from 8/10 to 1/10. In all of them indirect vision was reduced. The loss was generally less accentuated in the horizontal meridian than in the vertical. The restriction of the field was not alone peripheral but involved a zone of 15 to 20 degrees around the fovea; the loss being proportionate to central vision. The explanation, based on the Donders and Schmidt-Rimpler hypothesis, is that the optic nerve fibers which supply the periphery of the retina, being situated more superficially than the others, are earlier affected by

the increased intraocular tension and also that the peripheral retinal elements, normally less sensitive than those of central vision, are first affected by the circulatory changes.

Park Lewis.

9. CRYSTALLINE LENS

Alexander, G. F. **After cataract.** Trans. Ophth. Soc. United Kingdom, v. 50, pp. 142-148.

In the treatment of after cataract the author prefers a knife with a scimitar curve convex toward the capsular strands, to permit a drawing movement which divides the strands more easily and with less disturbance to the vitreous. The knife which he devised represents one-sixth of a circle of 5 mm. radius. In cases in which the futility of needling is obvious, the after cataract should be extracted. After instilling atropin a narrow keratome incision is made 2 mm. in front of the limbus, synechias are ruptured with a blunt hook, and the after cataract is picked up and extracted with a bent iris forceps or a toothless forceps. The author never had an infection follow.

Harold F. Whalman.

Ballantyne, A. J. **A case of congenital cataract with unusual features.** Trans. Ophth. Soc. United Kingdom, 1931, v. 51, pp. 103-107.

The case was one of small central bilateral lens opacity with eccentrically placed clefts. Good figures and slitlamp drawings illustrate the rather unusual structures. Absence of the embryonic Y sutures and possibility of the central cleft being remains of the original optic vesicle were discussed by the author and others. J. G. Kinney.

Biondo, M. d'A. **Contribution to the study of annular opacity of the lens.** Rassegna Ital. d'Ottal., 1932, v. 1, July-Aug., p. 503.

Biondo observed an annular opacity of the lens in a forty-three-year-old stone-cutter following a perforating wound of the eye. The opacity was retropupillary, preequatorial, and on the anterior surface of the lens. It was composed of granules of iris pigment, red globules of blood and fibrin, with alterations of the capsular epithelium and anterior lens fibers. The author explains the clinical picture as due to disturbed hydrostatic pressure of the aqueous, bringing the lens and iris into violent contact. A magnetic foreign body was present in the lens. Three colored drawings of the slitlamp appearance accompany the article.

Eugene M. Blake.

Crossley, E. R. **Intracapsular cataract extraction by the vacuum cup method.** Amer. Jour. Ophth., 1932, v. 15, Dec., pp. 1147-1149.

Filippi-Gabardi, E. **Researches on the relationship between senile cataract and cholesterinemia.** Lettura Oft., 1932, June, 9th yr., p. 282.

Quantitative determinations of cholesterin were made in fifteen senile cataractous lenses. Less cholesterin was found in the immature cataractous lenses, and in the majority of the cases examined there existed hypercholesterinemia and gerontoxon.

There was no constant and absolute parallel between these values and the amount of cholesterin in the blood of the patients. The author feels, however, that a correlation between hematic and lenticular cholesterin in cataractous subjects can be admitted.

F. M. Crage.

Frenkel, Henri. **Of Vossius' annular cataract from contusion.** Rev. Cubana de Oto-Neuro-Oftal. 1932, v. 1, May-June, p. 154.

After a historical review of the subject, the following conclusions are offered: Vossius' annular cataract is merely a portion of the traumatic syndrome, and may follow any blunt injury of the anterior segment. There is usually a rupture of the zonule, subluxation of the lens, an impact on the anterior lens surface by the fibers of the iris, and transient cataract.

A. G. Wilde.

Germani, C. **Clinical and anatomic-pathologic contribution to the pathogenesis of senile cataract.** Rassegna Ital. d'Ottal., 1932, v. 1, July-Aug., p. 462.

Germani has studied the pathology of senile cataract for over twenty years and gives a good résumé of the work done by himself and others in this field. He draws the following conclusions: In senile cataract the fibers are the elements primarily affected; the alterations of the capsular epithelium are secondary to the degenerative changes in the fibers; in the majority of cases of cortical cataract there is an evident participation of the crystalline fibers, due to alterations of their nutrition. The altered metabolism of the lens in cortical and nuclear cataract is usually associated with a pathological state of the organism, especially metabolic disturbances. Sclerotic cataract (cataracta nigra) is characterized by slow drying of the lens. Eugene M. Blake.

Gnanadickam, G. J. **The modern intracapsular operation for senile cataract.** Indian Med. Gaz., 1932, v. 67, Oct., p. 559.

The author describes in detail the technique of the Stanculeanu-Török-Elschnig operation and gives his results in 2000 cases, 1048 of which were operated upon by this method.

Incipient, immature, posterior cortical, and hypermature cataracts are best suited for this type of extraction.

M. E. Marcove.

Goldschmidt, H. **Clinical and histological findings in a case of fire lamella.** Zeit. f. Augenh., 1932, v. 78, Oct., p. 341.

In the lenses of workers exposed to great heat Kraupa and Elschnig have described changes which consisted of typical posterior polar cataract and the separation of a pellicle from the anterior lens surface. This latter Elschnig interpreted as zonular lamella. The author was able to study such an eye clinically and histologically, and found that the pellicle consisted of the entire capsule including the epithelium. Traumatic cataract did not develop.

F. Herbert Haessler.

Krause, A. C. **The chemistry of the lens.** Yale Jour. Biol. and Med., 1932, v. 5, Oct., p. 55.

This is a study of the growth, weight, and chemistry of the lens, including the immunological reaction of the lens proteins. The metabolism of the lens was studied in great detail. It was found that injury to the lens increased the oxygen consumption and allowed substances containing sulphur to pass into the aqueous. Part of the carbohydrate found in the lens is glycolyzed, while part is split into lactic acid and oxidized to carbon dioxide and passes into the aqueous. Narcotics inhibit this reaction. The metabolism of the lens is of about the same amount as that of red blood cells, or about ten percent of that of muscle, and greater than that of nerve. (143 references.) M. E. Marcove.

Lopez Lacarrère, J. **Cataract extraction by means of the electrophake.** Rev. Cubana de Oto-Neuro-Oftal. 1932, v. 1, May-June, p. 149.

The author conceived this method of cataract extraction while experimenting with the trituration and aspiration of lens substance. The first attempts, made on the eyes of rabbits, pigs, and calves, confirmed the idea that intraocular coagulation of lens substance was possible by means of diathermy. This is effected by a high frequency current that passes between two fine metallic electrodes without raising the temperature of the adjacent tissues. The electrodes, projecting from the tip of a fine glass tube, are placed in contact with the anterior lens surface, and the current started. This produces a localized coagulation by which the lens becomes adherent to the electrodes, traction on which will then rupture the zonule and cause the lens to be delivered in capsule. No untoward effects on the vitreous are reported. No case reports are appended. A. G. Wilde.

Malkin, B. **Iodin iontophoresis in senile cataract.** Zeit. f. Augenh., 1932, v. 78, Sept., p. 259.

By means of iontophoresis iodin can be brought into the aqueous and vitreous in greater quantity and with greater speed than is possible with other methods of administration. With the usual dosage no iodin enters the clear or cataractous lens. No objective

improvement in transparency of the lens could be discovered after iodin iontophoresis, and subjective observations were not convincing. Future observers should study the lens capsule and those substances which have a specific action on the capsule and fibers of the lens. F. Herbert Haessler.

Mylius, K. **Postoperative intraocular processes of shrinkage and traction and their treatment.** Zeit. f. Augenh., 1932, v. 78, Sept., p. 217.

Mylius describes the clinical course of the eye affection of two patients in whom an obstinate smoldering increasing abacterial inflammation healed promptly after operative therapy. The condition almost exclusively follows extracapsular cataract extraction with a round pupil, and is due to traction on the ciliary body produced by pupillary membrane from a lingering plastic inflammation. A striking symptom is the unusual depth of the anterior chamber at its center. Therapeutically the author inserts scissors through a keratome incision so that one blade enters the coloboma and lies behind the iris bridge and the pupillary membrane. One snip relieves the tension and the eye promptly heals. F. Herbert Haessler.

Palomar de la Torre. **Biomicroscopy of the lens.** Arch. de Oft. Hisp.-Amer., 1932, v. 32, Oct., p. 525.

The writer points out that in recording slitlamp findings, since no adequate means of photographing them exist, sketching of essentials rather than elaboration of details should be aimed at. This plan was followed in the more than one hundred sketches resulting from over 1000 observations in eighteen months. The narrow slit was found best for the study of the lens, and many of the sketches are composites of a series of narrow slit observations. A lens free from congenital anomalies was the greatest rarity. M. Davidson.

10. RETINA AND VITREOUS

Anderson, J. R. **Anterior dialysis of the retina: disinsertion or avulsion at the ora serrata.** Brit. Jour. Ophth., 1932, v. 16, Nov., p. 641.

This is part one. Structural characteristics, pathology of the zone, and effects of trauma aid separation of the retina at the ora serrata. Several features of anterior retinal dialysis are almost constant and more or less characteristic of the disorder, including the inferior temporal site, incidence in the male sex, nonmyopic refraction, and low age of onset. Under pathology of the ora serrata and its vicinity is discussed the presence of cystoid degeneration from retinal disease and cyclitis, causing contraction which results in tearing away of the pars ciliaris retinæ. The ciliary body in its temporal portion is particularly exposed to trauma. While typical signs of cyclitis are not always visible, yet haziness of the aqueous and vitreous are commonly present. Direct injury apart from cyclitis may tear the ora serrata. Indirect injury may rupture the tissues in their weak spots. After perforating wounds traction of scar tissue may produce dialysis. Hernia after operative procedures, needling of the posterior capsule, and, rarely, injury by contrecoup are factors to be considered. (Twenty-six illustrations.) D. F. Harbridge.

Aykroyd, W. R. **Night-blindness due to vitamin deficiency.** Trans. Ophth. Soc. United Kingdom, v. 50, pp. 230-237.

Functional night-blindness has been thought to be due to vitamin deficiency. Pillat stated that forty-nine out of ninety Chinese soldiers complaining of night-blindness showed such lesions as Bitot's spots, xerosis conjunctivae, and keratomalacia, indicating a close connection between all these conditions. The writer made a series of observations in Newfoundland and Labrador in the summer of 1929. A group of cases of hemeralopia were found to be on diets deficient in vitamin A and consisting mainly of white bread, molasses, fresh cod muscle, salt meat, beans, peas and some potatoes, with no milk, butter, eggs, or green vegetables. In that country cod-liver oil is strictly an export. In some cases the disease developed in less than a month after the patient had been on a diet devoid of

vitamin A. All cases were curable in twelve to thirty-six hours by one or two doses of cod-liver oil. In women the disease is usually associated with pregnancy, clearing up spontaneously after delivery. The very rapid curative effects of cod-liver oil suggest a close relationship between visual purple and vitamin A. Harold F. Whalman.

Ballantyne, A. J. **A case of detachment and reflection of the retina.** Trans. Ophth. Soc. United Kingdom, 1931, v. 51, pp. 113-115.

Retinal detachment in a male of twenty-four years followed a blow while boxing; the case as described being seen a month after the injury. There was a tear in the upper quadrant near the ora serrata, allowing the retina to fall downward into the vitreous so that the posterior surface was turned toward the observer. No fundus structures could be seen in normal position although a few vessel twigs appeared on the curled edge of the torn retinal membrane. An appreciable amount of vision remained, i.e. central fixation, and a small field in the upper quadrant. Other similar cases are described, including one of which Treacher Collins published a drawing in the Transactions volume 37. A full page plate and a field study accompany the present article. J. G. Kinney.

Bartels, Martin. **Experience with Guist's operation for detached retina.** Zeit. f. Augenh., 1932, v. 78, Oct., p. 322.

The author performed the Guist operation in seven eyes that were favorable for neither the Guist nor the Gonin technique. In one of them anatomical and functional healing resulted. In one eye there was very extensive hemorrhage, an experience which the author, contrary to the experience of others, never had after any of his twenty-nine Gonin operations. Chemosis may be avoided by drying the area before applying the caustic. Diplopia is an unpleasant complication. Probably there is extensive scarring because the eyeball must be exposed so far back. In Vienna the author saw eyes that had become immobile after repeated operations. But the operation has several advantages. Exact localization is not necessary, one can operate in the presence of multiple and large tears, and one can even operate when vitreous opacities obstruct a clear view of the fundus. Secondary tears occur less frequently than after Gonin operations. The disadvantages are the necessary temporary abscission of a muscle, and the tediousness of the operation, the most skillful operator needing two hours. F. Herbert Haessler.

Courtis, B. **Pathological anatomy of the vitreous body.** Arch. de Oft. de Buenos Aires, 1932, v. 7, Jan., p. 16.

This paper is a summary of the pathological anatomy of the vitreous body, based on the work of R. Greef, as published in the collection of F. Hanke and O. Lubarsch (Berlin). (Nine microphotographs.)

R. Castroviejo.

Davenport, R. C. **A case of spasm of the central retinal artery.** Trans. Ophth. Soc. United Kingdom, 1931, v. 51, pp. 115-124.

The author points out the rarity of cases in which temporary obstruction ascribed to spasm has been observed in progress. A male aged fifty-seven years had toxic symptoms, cramplike pains, and sudden attacks of visual loss in the left eye—all brought on by any strain or muscular effort. The teeth and gums were badly infected so the teeth were extracted. The attacks increased in frequency, with some variation in the amount of visual loss or field defect. Later the right eye was also involved. The author's notes on a complete attack as observed with the ophthalmoscope, and on the induction of an attack for the purpose of study, are very interesting. References to previously published cases are appended.

J. G. Kinney.

De Saint-Martin. **A localizing instrument for retinal tears by P. J. Imre of Budapest.** Ann. d'Ocul. 1932, v. 169, Nov., pp. 891-893.

The instrument consists of a straight bar to which is pivoted a pointer. One

end of the pointer extends to an arc graduated in degrees, while the opposite end crosses another arc which is marked in millimeters and corresponds to the curve and size of the globe from the posterior pole to the limbus. The device is used as follows. The meridian of the tear is determined by the ophthalmoscope and marked at two points on the limbus, and likewise the vertical meridian. Two sutures are placed, one at the vertical limbal mark along which the patient gazes, the other at the tear meridian as projected through the hole in the ophthalmoscope mirror. The observer then aims along this second suture at the tear, while an assistant measures the angle between the sutures. The degree of this angle is then transposed to the instrument and the millimeters back of the limbus are read directly. Great precision in localization is claimed by the use of this instrument. H. Rommel Hildreth.

Federici, E. **Senile rupture of the macula.** Arch. di Ottal., 1932, v. 39, Aug., p. 365.

The author feels that the best pathological explanation at the present time for rupture of the macula is that it is due to edema from inflammatory causes or from circulatory disorder. This mechanism may also come into play in cases of senile rupture of the macula. The author cites two cases of senile rupture of the macula with rare alterations of the retina. H. D. Scarney.

Garreton Silva, A. **The diabetic with retinitis.** Boletin de Informacion Oft., 1932, July-Aug., pp. 217-227. (See Amer. Jour. Ophth., 1932, v. 15, Sept., p. 875.)

Gray, W A. **Retinal vessel changes in diabetes.** Trans. Ophth. Soc. United Kingdom, 1931, v. 51, pp. 108-112.

The material for this article includes 228 cases of diabetes. Retinitis was of two types: (1) a reduction in vessel caliber, straight vessels with small circular hemorrhages on the macular side of the temporal vessels, as well as characteristic exudate; (2) those showing larger and more superficial retinal hemorrhages along the temporal veins, some beading of the veins, and hemorrhage into the vitreous. Cataract occurred in twenty-five cases, considered as senile. The severity of the diabetic condition is an important factor in vessel changes. J. G. Kinney.

Kunz, Eberhard. **Indications and results in Gonin's operation.** Zeit. f. Augenh., 1932, v. 78, Sept., p. 202.

Of forty-five cases of retinal detachment seen in the Königsberg clinic in ten and one-half months of 1931, twenty-one were immediately discarded as old cases already considered unsuitable for any therapy. Of the twenty-four, twelve were considered suitable for surgery, that is, tears were not too large or inaccessible, and exudate was not obviously the cause. Of the eight patients who consented, four were healed with improvement of vision. Probably Amsler's statistics are fairly representative of average clinical material. Gonin's patients seem to be selected for him by the men who send them in from all over Europe, and are therefore not fairly representative.

F. Herbert Haessler.

Lawson, Arnold. **Further report on a case of bilateral symmetrical retinal detachment with 6/5 vision.** Trans. Ophth. Soc. United Kingdom, v. 50, pp. 149-166.

The author reports further developments in a case of detachment of the retina which came under his observation in 1923 and which he reported at the 1924 meeting. The patient, a woman aged forty-five years with a low degree of hyperopia, after a known period of bilateral retinal detachment for seven years, finally had spontaneous reattachment of both retinas. After the reattachment the fields did not increase and areas of choroidal atrophy were noted. In the author's opinion the etiologic factor was a symmetric choroiditis from a toxemia of the exact nature of which he was not positive but probably due to oral sepsis. During the course of the detachment the principal treatment consisted of bed rest and scleral punc-

ture, but eighteen months had intervened since the previous examination when the reattachments were discovered. Harold F. Whalman.

Lyle, D. J. **"Moon eye"; gyrate atrophy of the choroid and retina.** Amer. Jour. Ophth., 1932, v. 15, Dec., pp. 1165-1166.

North, E. P., and Jones, V. L. **Retinal detachment associated with proliferative changes of retinal pigment epithelium simulating neoplasm.** Jour. of the Missouri State Med. Assoc., 1932, v. 29, Oct., p. 443.

The authors give the differential diagnosis between glioma and eight other conditions, namely, (1) persistent posterior part of fetal fibrovascular sheath of the lens; (2) simple detachment of the retina; (3) leucosarcoma of the choroid; (4) chronic inflammatory processes of the uveal tract; (5) pseudoglioma and abscess of the vitreous; (6) detachment of retina with dropsical degeneration of visual cells; (7) retinitis circinata; and (8) exudative retinitis with formation of connective tissue between retina and choroid.

A case of the last-named condition is reported in a child of eleven years. The eye was removed, and a very complete detailed report of the microscopic findings is given by Lamb.

Ralph W. Danielson.

Royle, N. D. **The treatment of blindness associated with retinitis pigmentosa.** Med. Jour. Australia, 1932, v. 2, July 23, p. 111.

Royle argues that since the retinal blood vessels, in common with all other blood vessels, are constricted by the action of the sympathetic nervous system, division of the sympathetics would lead to loss of power of constriction of the arterioles and venules and thus alter one of the outstanding pathologic features of this disease. He gives in detail his method of doing a sympathectomy just below the first thoracic ganglion. This operation of course causes a Horner's syndrome, consisting of a depression of tone in the ipsilateral face musculature, contraction of the pupil, dilatation of the retinal vessels, enophthalmos, and ptosis. Of fourteen cases reported in conjunction with Brierley, nine had lost their central fixation, and in none of these was permanent improvement obtained. Of the remaining five patients, taken at an earlier stage, four have maintained improvement and one has lost ground after immediate response. Some interesting accessory results were cure of contralateral deafness in two cases, relief of headache in several cases, and improvement in the contralateral eye. (Six fields, two references.) Ralph W. Danielson.

Thomson, Ernest. **Memorandum regarding a family in which neuroretinal disease of an unusual kind occurred only in the males.** Brit. Jour. Ophth., 1932, v. 16, Nov., p. 681.

Parents and forbears of the patient, as far as traceable, all had good eyes. The mother gave birth to eight children and had two miscarriages. All births were abnormal. Of the eight children four were girls with normal vision and four boys with defective vision. The boys all had a peculiar radiating macular condition with varying degrees of optic nerve disturbance. One with chronic retinal disease suffered a retinal detachment. The visual acuity of the right eye equaled respectively 6/36, 6/18, less than 6/60, 6/12. The visual acuity of the left eye equaled 6/36, 6/24, 6/24, 1/60. (Two fundus illustrations.) D. F. Harbridge.

Urrets Zavalia, A., and Brandon, R. A. **The eyegrounds in hypertensive diseases.** Arch. de Oft. de Buenos Aires 1932, v. 7, Jan., p. 3, and Feb., p. 103.

Three groups of patients have been studied: (1) patients with nephrosclerosis, (2) patients with nephritis of pregnancy, (3) patients with hypertension and syphilis. Some findings observed in the eyegrounds of these patients are enumerated, with the addition of clinical histories of patients with acute, subacute, and chronic glomerulonephritis, as well as of patients with essential hypertension. R. Castroviejo.

11. OPTIC NERVE AND TOXIC AMBLYOPIAS

Adie, W. J. **Acute retrobulbar neuritis in disseminated sclerosis.** Trans. Ophth. Soc. United Kingdom, v. 50, pp. 262-267.

Ninety-two patients with acute retrobulbar neuritis were examined for indications of disseminated sclerosis, and eighty-four patients with established disseminated sclerosis were questioned for history of an acute attack of retrobulbar neuritis. Thirty-four percent of the patients with retrobulbar neuritis obviously suffered from disseminated sclerosis. The question is asked how many of the remaining two-thirds may eventually suffer from disseminated sclerosis. Stern found that thirty-five percent of two hundred cases of disseminated sclerosis gave a history of attacks of misty vision. These cases were first seen by the ophthalmologist. One case with pale discs and defective vision had had an attack of retrobulbar neuritis forty years previous to development of definite spinal sclerosis.

Harold F. Whalman.

Adinolfi, Vincenzo. **A case of bilateral quinine amaurosis with papilledema.** Lettura Oft., 1932, 9th yr., June, p. 293.

Rapid loss of vision quickly followed a single hypodermic injection of a normal dose of quinine in a male aged thirty-seven years, in the stage of lysis of an attack of influenza. Light perception remained in the nasal and superior fields of one eye; the other eye was totally blind. The discs were elevated, twice their normal breadth, but profoundly pale. The emergent vessels were greatly constricted and the entire fundus extremely anemic.

F. M. Crage.

Bardanzellu, T. **Clinical contributions to the study of oxycephaly.** Arch. di Ottal., 1932, v. 39, May, p. 201.

The author discusses the existing discordance in the definition of the picture which one recognizes as oxycephaly. He presents one case which offers all the alterations of a pathological cranium with atrophy of both optic nerves, accentuated exophthalmos in both eyes, luxation of the globe of the left eye, and nystagmus of both eyes. He feels, after an observation of two years, that the pathological process was due to an increase in the fluid pressure and was caused by a meningitic process associated with adenoidism.

H. D. Scarney.

Belgeri, F., and Valda Arana, R. **An exceptional case of papillary extasia with exophthalmos.** Boletin de Informacion Oft., 1932, 5th yr., July-Aug., pp. 237-250.

In a woman of forty-four years, the history pointed to gradual development of the conditions found upon examination, which included diminution of vision, exophthalmos, conjunctival chemosis, and papilledema. Various laboratory and clinical tests were negative, including examination of the accessory nasal sinuses. The patient experienced rapid improvement of vision after shrinking of the nasal tissues with cocaine and adrenalin, and this intranasal application was repeated on the three following days, in the course of which the vision, as well as the appearance of the eyeball and of the fundus, returned to normal. The authors' statements as to the patient's vision are not entirely satisfactory, because she was forty-four years old, and after treatment accepted plus 3.50 spheres, whereas the vision of 1/6 at the first examination was apparently without correction.

W. H. Crisp.

Goldstein, H. Z. **The relation between optic nerve pathology and sinus disease, with report of a case of neuroretinitis.** Jour. of Med. Soc. of New Jersey, 1932, v. 29, Sept., p. 704.

The author reviews the anatomy of the sinuses and optic nerve and shows the close relationship between the optic nerve and the sphenoid and posterior ethmoid sinuses. The various theories of causation are discussed, including the allergic and the negative pressure theories, hyperplastic sinusitis, small optic canals, and direct extension. The case reported is of a man who suddenly noticed blurring of vision of the left

eye. There was deep pain in the orbit, more marked on moving the globe. An oculist found neuroretinitis, with vision of hand movements. Examination by an otolaryngologist revealed a deviated septum, diseased tonsils, and hypertrophy of the right inferior turbinate. X-ray of the sinuses showed slight clouding of the left ethmoid. After left-sided submucous resection, middle turbinectomy, ethmoidectomy, and sphenoidectomy, the patient made an uneventful recovery, regaining full vision.

M. E. Marcove.

Hill, Emory. **Papilledema and intracranial complications of leukemia.** Amer. Jour. Ophth., 1932, v. 15, Dec., pp. 1127-1132.

Knapp, Arnold. **Association of sclerosis of the cerebral basal vessels with optic atrophy and cupping: report of ten cases.** Arch. of Ophth., 1932, v. 8, Nov., pp. 637-648.

Ten cases showed cupping of the discs and optic atrophy, with tension varying from 14 to 31 and averaging about 20 mm. of mercury. The fields showed altitudinal defects and varied from the usual findings in glaucoma. In general, the constitutional symptoms were those of a moderate, general arteriosclerosis, with no particular evidence of cerebral involvement. Roentgen examination in all cases showed calcification of the internal carotid, posterior communicating, and ophthalmic arteries. Those cases followed for a number of years either did not progress, or showed very slight changes. Operation in two cases had no influence upon the condition. The author is inclined to believe that arteriosclerotic changes are responsible for this interesting condition. M. H. Post.

Kuhn, H. S. **Meningitis with ocular complications.** Amer. Jour. Ophth., 1932, v. 15, Dec., pp. 1166-1168.

Manes and Mabran. **Retrobulbar neuritis of diabetic origin.** Arch. de Oft. de Buenos Aires, 1932, v. 7, April, p. 199.

Two cases are reported in detail. Diabetic scotoma is more sharply defined than that of tobacco poisoning. The various therapeutic agents that affect the vascular supply have been found without effect in the former condition.

A. G. Wilde.

Moore, J. E. **The syphilitic optic atrophies.** Medicine, 1932, v. 11, Sept., pp. 263-320.

Ninety percent of syphilitic optic atrophies are of the primary type, and syphilis outnumbers all other causes combined. It is estimated that there are constantly about 50,000 patients with syphilitic primary optic atrophy in the United States. Primary optic atrophy may be due to the pressure of syphilitic inflammatory tissue, or to basilar meningitis. It may occur as an almost isolated phenomenon in neurosyphilis, without associated clinical evidence either of tabes or of meningitis.

The average time from onset of symptoms to blindness is two to three years. The process begins in the marginal fibers of the optic nerve distal to the chiasm. Patients treated with arsphenamine, bismuth, mercury, and the iodides in any combination and for any length of time appear to become blind about as rapidly as if nothing had been done. Subdural treatment with arsphenaminized serum, neoarsphenamine, bichloride of mercury dissolved in salt solution or spinal fluid, mercurialized serum, or air injected intraspinally or intracisternally, has, however, been found to be of some value in the hands of many observers. The percentage of favorable results obtained from the use of fever therapy is lower than from subdural treatment. Tryparsamide is absolutely contraindicated in the treatment of syphilitic optic atrophies. (About 100 references.)

Ralph W. Danielson.

Onken, T. **An affection of the optic nerve with peculiar vascular involvement and secondary glaucoma.** Zeit. f. Augenh., 1932, v. 78, Oct., p. 329.

A patient developed the typical ophthalmoscopic picture of embolism of two vessels which in all probability were cilioretinal arteries. In the course of a few months many minute hemorrhages appeared and were resorbed.

A network of fine vessels appeared on the disc, a deep excavation of the entire disc developed, and in the course of two weeks the vascular network disappeared. The tension varied between 45 mm. and 22 mm. The lesion was probably a vascular one which led to softening just posterior to the lamina cribrosa. F. Herbert Haessler.

Wolff, Eugene, and Davies, Francis. **A contribution to the pathology of papilledema.** Ophth. Soc. United Kingdom, 1931, v. 51, pp. 170-185. (See Amer. Jour. Ophth., 1932, v. 15, March, p. 269.)

12. VISUAL TRACTS AND CENTERS

Endelmann, L. **Two cases of bitemporal hemianopsia of sudden onset and unknown etiology.** Zeit. f. Augenh., 1932, v. 78, Sept., p. 234.

In one of the author's patients bitemporal hemianopsia developed suddenly after a blow on the head. The general neurological diagnosis was not unequivocal. Multiple sclerosis was suggested. Four years later a similar attack of hemianopsia came on. The neurologist again thought multiple sclerosis might be considered but was inclined to doubt this. In the second patient an attack of retrobulbar neuritis was followed nine days later by involvement of the right eye, so that the patient now had bitemporal hemianopsia with central scotoma of the nasal one-half in the left eye and relative scotoma in the right eye. Though the general neurological examination was negative, both the author and the neurologist were inclined to believe the patient had multiple sclerosis.

F. Herbert Haessler.

Meves, Hans. **On the differential diagnosis of the Foster Kennedy syndrome.** Zeit. f. Augenh., 1932, v. 78, Sept., p. 242.

Though the Foster Kennedy syndrome (central scotoma on the same side as the tumor with contralateral papilledema) was described in 1911 as characteristic of basal tumors, it has received little notice in Germany. In differential diagnosis a scotoma from multiple sclerosis can usually be ruled out from its sudden onset and gradual disappearance, while with basal tumors the scotoma can be seen to increase gradually. The other optic nerve lesions with central scotoma (toxic amblyopia, lues, tuberculosis, diabetes) have an entirely different clinical picture. Leber's hereditary optic atrophy and chiasmal disease with central scotoma as reported by Nettleship and by Knapp may cause some difficulty in diagnosis. The changes at the disc may vary from bilaterally normal to bilateral papilledema. Other neurologic findings may be completely absent. The syndrome is, however, not found exclusively with tumor or abscess at the base of the brain. The author reports his clinical findings in five instances of this syndrome. In the first it was caused by a frontal lobe tumor, in the second by a bone tumor arising from the floor of the fossa. In the third no intracranial tumor was found at operation, but the subsequent course made it clear that an intraorbital mass was present. A fourth patient with typical clinical findings had a circumscribed external hydrocephalus in the region of the cisterna chiasmatis (arachnoiditis). The fifth patient had a cerebellar tumor. At autopsy it was found that an enlargement of a recess of the third ventrical caused pressure in such a way as to bring about the Foster Kennedy syndrome instead of the usual binasal hemianopsia. F. Herbert Haessler.

Paterson, J. E. **A series of lesions in the vicinity of the optic chiasma: seven cases verified by operation.** The Glasgow Med. Jour., 1932, v. 68, Sept., p. 149.

After giving the seven case reports in detail, the author says he favors the intracranial approach in surgery instead of the transsphenoidal route. Of the intracranial approaches he prefers the transfrontal operation instead of the anterolateral. There were four cases of pituitary adenoma, one case of hydrocephalus simulating suprasellar growth, and two cases of meningioma. (Thirteen references.)

Ralph W. Danielson.

13. EYEBALL AND ORBIT

Bachstez, Ernst. **The localization of the inflammation in serous tenonitis.** Zeit. f. Augenh., 1932, v. 78, Sept., p. 211.

In a patient with repeated attacks of serous tenonitis over a period of twenty-five years, paralysis of one extraocular muscle was noted in each recurrence before the exophthalmos had appeared or while it was very slight. This, together with the fact that the fundus and the ocular functions remained undisturbed, as well as anatomical considerations, lead to the conclusion that the inflammation is in the tissue of Tenon's capsule itself, in the region which surrounds the distal portion of the muscles. An equatorial localization would also explain the glaucoma which sometimes complicates serous tenonitis.

F. Herbert Haessler.

Baquis, M. **Photopsia and visual hallucinations in an individual with bilateral enucleation.** Lettura Oft., 1932, 9th yr., June, p. 271.

A man aged fifty years had been blind in his right eye since birth. This eye, which was enucleated in 1922, had optic atrophy and a calcareous cataractous lens. The left eye had always been myopic and with it the patient had enjoyed 0.5 vision up to the age of thirty-five years. In 1924 the left eye was found to have increased intraocular tension, with a complicated incipient cataract. Iridectomy for the glaucoma was followed by hemorrhage and iridocyclitis. The eye became blind. In 1927, at the patient's request and because of pain and photopsia, this eye was enucleated. The luminous visual disturbances persisted. Not only were varicolored sparks and lights complained of, but actual mosaic tables and fantastic color formations. Sedatives were of no avail. The visual disturbances were not from the right eye, but had occurred only after the left eye had lost its vision. Neurological and physical examinations were normal. Orbital examination showed no unusual scarring.

The author accepts these phenomena as either being located in the cerebral cortex of the occipital lobe or resulting from some peripheral stimulus associated with unknown cortical or central action. F. M. Crage.

Clinton, F. S., and Ward, B. W. **Bilateral orbital abscesses following sinusitis; case report.** Jour. of the Oklahoma State Med. Assoc., 1932, v. 25, Sept., p. 376.

A fifteen-year-old boy began on October 30, 1931, to have severe occipital headache. A week later a red spot appeared at the root of the nose and spread with some rapidity over both infraorbital regions, so that a diagnosis of erysipelas was made. The scalp, cheeks, upper lip, and forehead became enormously swollen, both eyes were closed, both eyeballs protruded, and a purulent, bloody discharge presented from both nares. At this time the boy was first seen by the authors. By November eighteenth he seemed much better, but a few days later he developed bilateral parotitis, and four points of suppuration on the face were drained. On November twenty-fifth both orbital cavities were drained. On December fourth the x-ray showed metastases to the lung. A few days before death from pneumonia on December eleventh a large amount of pus was discharged from the left nostril. (Seven references.) Ralph W. Danielson.

Damel, C. S. **Primer of useful information for those who have undergone enucleation.** Boletin de Informacion Oft., 1932, 5th yr., March-April, pp. 107-119.

This is a well illustrated chapter from a history of the making of artificial eyes, particularly during the middle ages. W. H. Crisp.

Naffziger, H. C. **Progressive exophthalmos after thyroidectomy.** The Western Jour. of Surg. Obstet. and Gynecol., 1932, v. 40, Oct., p. 530. (See Amer. Jour. Ophth., 1933, Jan., v. 16, p. 87.)

Sabadeanu, V. **Thrombophlebitis orbitocavernosa.** Zeit. f. Augenh., 1932, v. 78, Oct., p. 335.

The author reports his observations of a child who died from thrombophlebitis orbitocavernosa which was typical as to clinical aspect and course and etiological agent, but was unusual in that the primary infection was conjunctival. Only one other such observation has been reported. Weil's assertion that death ensues within twenty-four hours after the development of bilateral chemosis was borne out in this instance. At autopsy a true pyogenous thrombus was found in the sinus. The orbital veins were also involved, which shows how futile surgical treatment of the sinus would be.

F. Herbert Haessler.

Villard, H., and Dejean, C. **Voluminous angioma of the orbit. (Cavernous and telangiectatic.)** Arch. d'Opht., 1932, v. 49, Oct., p. 638.

A girl of eighteen years presented an extreme degree of displacement of the left eye downward, outward, and forward by a soft tumor mass located in the upper portion of the orbit. The exophthalmos had gradually increased since the age of three years. The fundus appeared normal and there was a hyperopia of from eight to nine diopters. The right eye was perfectly normal. A diagnosis of angioma of the orbit was confirmed at operation. The tumor mass was found to surround the optic nerve. Optic atrophy, ptosis, and almost complete loss of function of the extraocular muscles ensued. Histological examination showed the tumor to consist of a combination of cavernous hemangioma and telangiectasis. (Two photographs, one photomicrograph.)

M. F. Weymann.

Zanni, B. **Orbital complications of sinus infection.** Riv. Oto-Neuro-Oft., 1932, v. 9, June-July, pp. 97-108.

A boy twelve years of age, after an attack of influenza, became affected with painful edema of the upper nasal angle of the left orbit. The eyeball was displaced downward and outward. From the radiographic and nasal findings a diagnosis was made of left frontal sinusitis with probable abscess of the orbit. The pus was evacuated and the patient recovered with normal vision. A woman sixty-three years of age, after an attack of influenza, had chronic right frontal headache, deviation of the eyeball downward and outward, and discharge of yellowish pus from the right nasal cavity. Radiography showed disappearance of the orbital part of the frontal, and fronto-ethmoidal mucocele with retrobulbar abscess was diagnosed. The patient recovered after the pus had been evacuated. (Bibliography and two figures.) M. Lombardo.

14. EYELIDS AND LACRIMAL APPARATUS

Argañaraz, Raul. **The treatment of chronic dacryocystitis and lacrimonasal fistulization.** Amer. Jour. Ophth., 1932, v. 15, Dec., pp. 1117-1120.

Gregory, P H. and Davidson, A.M. **A case of kerion celsi associated with ringworm of the eyelashes and accompanied by a trichophytid.** Canad. Med. Assoc. Jour., 1932, v. 27, Nov., p. 485.

Two cases of kerion associated with Trichophyton album are reported. One of the patients showed also a lesion of the eyelid from which the same fungus was isolated. Attention is drawn to the rarity of this condition. The patients were brothers, and the probable source of infection was cattle. Each developed a trichophytid of the lichenoid type during the third and fourth weeks, respectively, of the disease. The treatment used was boric acid and starch poultices applied to the kerion. The kerion and the eyelid lesions disappeared after development of the trichophytid. This event is considered to have been associated with the development of specific immunity which was responsible for the spontaneous cure.

M. E. Marcove.

Mayou, M. S. **Treatment of chronic blepharitis with vaccine.** Trans. Ophth. Soc., United Kingdom, 1931, v. 51, pp. 48-51.

Chronic and recurrent blepharitis of the severe ulcerative variety, not affected by local applications, but giving rise to trichiasis, ectropion, and other severe sequels, is described. Systemic

infection and focal sources are mentioned as contributing to chronicity, and a table showing the average hospital stay for such cases as compared with trachoma indicates the seriousness of the infections. The author's treatment includes the use of a mixed staphylococcus and Morax-Axenfeld vaccine made up in strengths of 500 million of each organism per c.c., the injections being made directly into the lid as near the border as possible. No mishaps have been noted from over 2000 doses of vaccine. A report of the most intractable case is given, as well as a statistical table comparing the vaccine treatment with other methods. J. G. Kinney.

15. TUMORS

Baquis, M. **Contribution to the study of tumors of the reticulo-endothelial system; a case of reticuloma of the orbit.** Lettura Oft., 1932, 9th yr., April, p. 167.

The author reports clinical and histological observations of a case of reticuloma of the orbit which appears to be the first described in ophthalmic literature. The tumor, rapid in growth, was in a healthy boy of ten years. The mass was intensely radio-sensitive and an apparent cure was obtained on frequent occasions from the application of radium. A severe recurrence after ten months necessitated orbital exenteration. There were recurrences of the growth in the fifth and sixth months following this operation. The patient died of cerebral complications about two months later. F. M. Crage.

Freiman, George. **Squamous-cell epithelioma at the limbus.** Amer. Jour. Ophth., 1932, v. 15, Dec., pp. 1157-1164.

McDowall, V., and Marks, E. O. **A case of retinal glioma treated by the insertion of radium needles in the orbit.** Brit. Jour. Ophth., 1932, v. 16., p. 686.

A male child aged six months had bilateral glioma. The left eye, with acute glaucoma, was excised. Sections confirmed the diagnosis. Examination of the right eye revealed a mass in the upper temporal quadrant. Three 0.5 mg. needles of 0.5 cm. active length with a filtration through 0.5 mm. of platinum were inserted through small incisions in the upper lid over the area nearest the base of the tumor, spaced one centimeter apart. The needles were removed after six days, with a total dosage of 216 mg. hours. The mass had practically disappeared. About six weeks after the first treatment radium was again applied, through a Columbia paste mold 2.0 cm. in thickness, to the upper part of the orbit and the right temporal region by means of 4.0 mg. needles each of 2.0 cm. active length filtered with 0.5 mm. of platinum, a total dosage of 960 mg. hours. No recurrence was observed after seven months observation.

D. F. Harbridge

Marin Amat, Manuel. **Melanotic sarcoma developing on a pterygium.** Ann. d'Ocul., 1932, v. 169, Nov., pp. 885-891.

In a man of forty-three years a black mass developed on an old pterygium. A biopsy specimen confirmed the diagnosis. The regional lymph glands were not enlarged. The tumor was completely removed by radium treatment, leaving the pterygium proper.

H. Rommel Hildreth.

Mura, F. **Epibulbar epithelioma.** Ann. di Ottal., 1932, v. 60, April-May, p. 260.

After reviewing the literature three cases are described in detail. These neoplasms are frequently malignant. Many cases are on record of recurrence after removal. Metastasis in distant tissues is rare, although such cases are on record. The treatment is essentially surgical, and favorable results depend on early operative intervention. Recurrence in two of the author's cases rendered orbital exenteration necessary. Many authors consider that radiotherapy should precede removal of the tumor. But in one case an apparent cure thus obtained was followed by rapid and malignant recurrence. (Bibliography.) Park Lewis.

Natale, Amadeo. **Primary adenocarcinoma of the orbit.** Boletin de Infor-

macion Oft., 1932, 5th yr., March-April, pp. 101-107.

A man of forty-six years had noticed diminution of vision of the left eye for the previous seven years, and had had pain in the eye for three years. At examination the vision of this eye was found reduced to 1/40, and there was a swelling of the size of a hazel nut beneath the eyebrow. The tumor was removed through a conjunctival incision beneath the outer third of the eyebrow, being dissected with difficulty from the depth of the orbit. Five months later the vision of this eye was 1/10, and there was still some diplopia. The histologic diagnosis was adenocarcinoma. W. H. Crisp.

16. INJURIES

Baker, F. A., and Larson, B. T. **The prevention of symblepharon. Report of a case and description of appliance used.** Jour. Michigan State Med. Soc., 1932, v. 31, Nov., p. 702.

After a second-degree burn of the eyelids, cornea, and conjunctiva from a sulphuric-acid explosion, symblepharon was prevented by leaving an ovoid glass beneath the lids for eight days. The glass was well tolerated after the first few hours. The lens was ground on a 20 D. base, and was sufficiently large to keep the retrotarsal fold stretched. M. E. Marcove.

Bartels, Martin. **Corrosive injury of the cornea and conjunctiva from stalactites.** Zeit. f. Augenh., 1932, v. 78, Oct., p. 327.

A miner with an old trachoma, into whose eyes a concentrated solution of salt from a stalactite had dripped, claimed compensation because a symblepharon had developed. Bartels found that the solution caused only a transient superficial injury to the cornea and conjunctiva of rabbits and decided that the symblepharon could not be ascribed to the alleged injury.
F. Herbert Haessler.

Berrisford, P. D. **Effects of intense light upon the retina.** Amer. Jour. Ophth., 1932, v. 15, Dec., pp. 1133-1137.

Cordero, C. **The penetrating wounds of the eye observed in the 30 years 1901-1930 in the Royal Eye Clinic, Parma.** Arch. di Ottal., 1932, v. 39, July, p. 327.

At the Royal Eye Clinic of Parma, the author undertook the clinical study of 936 cases of perforating wound of the globe which came for treatment from 1901 to 1930. The small number of sympathetic complications following such wounds is attributed by the author to accurate and protracted surveillance of the patients, which almost always made it possible to avoid the development or to arrest the course of complications that would have gone on to blindness. H. D. Scarney.

Epstein, David. **The effects of toad venom on the eye.** South Africa Med. Jour., 1932, v. 6, June 25, p. 403.

Having heard of a patient who had experienced temporary blindness from the venom of an African leopard toad being squirted into his eye, the author did some experimental work using cats and rabbits. He concludes that the venom of this toad—Bufo regularis—when applied to the eye may produce temporary painful blindness. A digitalis-like substance present produces irritation and the adrenalin present dilates the pupil. (Three references.)
Ralph W. Danielson

Fietta, P. **Ocular injury from brass foreign bodies. Tolerance and chalcosis.** Ann. d'Oculˌ, 1932, v. 169, Oct., pp. 784-794.

Two cases are reported. In the first patient, a boy aged nineteen years, the brass lodged in the vitreous, having passed through cornea, iris and lens. The lens remained relatively clear, the foreign body could be seen with the ophthalmoscope, and after two years there was no evidence of irritation. The second patient, a boy of fifteen years, had been injured in both eyes by brass about eight months previously. Cataracts developed. Foreign bodies remained in the cornea of the right eye, and after about six months typical chalcosis was seen in the cornea. The left eye showed chalcosis of the vitre-

ous, in which the foreign body was lodged. H. Rommel Hildreth.

Frenkel, Henri. **In taking apart the plow. . . .** Arch. d'Opht., 1932, v. 49, Oct., p. 628.

Personal experiences show the frequency of intraocular metallic foreign body in farmers. Practically all of these foreign bodies penetrated the eye during the act of making repairs to a plow. The writer believes that much valuable time is lost by waiting for x-rays to be used, and that the diagnosis can be better made with the giant magnet. Of his series of sixty-six cases only twenty-five percent retained useful vision. Farmers should be educated as to the danger of metallic foreign bodies and advised to protect themselves by the use of goggles when hammering on metal or stone. M. F. Weymann.

Johnson, M. C. **Wasp sting of the cornea.** Jour. Amer. Med. Assoc., 1932, v. 99, Dec. 10, p. 2025.

A man aged twenty-six years was stung by a wasp in the lower central portion of the right cornea. At the point of injury there was an opaque area about three millimeters in diameter. There was marked injection of the bulbar conjunctiva. The cornea was insensitive. The internal ocular structures were not involved. The usual treatment, consisting of atropin, dionin, and hot packs, was instituted. On the day following the injury a peculiar lattice-like opacity of the cornea was noted, most marked at the center of the cornea, and fading toward the periphery. In a week's time the intense reaction had subsided, the eroded area had healed, and the striate opacity had disappeared. There were no complications. Three months later the vision with a slight correction was 20/40+3.

The literature is quoted and the differences between the stings of the wasp and the bee are described. Wasp stings of the cornea are considered more dangerous than those of the bee. The author speculates that the formation of the lattice-like opacities may be due to changes of a neurotrophic nature, caused by the wasp toxin.

George H. Stine.

Stieren, Edward. **Magnet extraction from the vitreous.** Amer. Jour. Ophth., 1932, v. 15, Dec., pp. 1120-1122.

17. SYSTEMIC DISEASES AND PARASITES

Berneaud, G. **Allergic diseases of the eye.** Zeit. f. Augenh., 1932, v. 78, Sept., p. 193.

Patients reacted with severe conjunctival redness to substances to which they were sensitive, such as eel blood, teak wood, fish, dog, or hair dye. The author systematically studied a series of fifteen patients who had for years had inflammation of the conjunctiva and lids refractory to all treatment. Since scrofulous disease heals by the twenty-fifth year, he included only patients that were more than twenty-five years old. Almost all allergic patients become sensitive to ointments after the first week of their use. Eleven of the patients were allergic, and in seven of these the cause of the hypersensitivity was found. All patients sensitive to feathers were improved by using wool pillows. Two could be desensitized. (See also American Journal of Ophthalmology, 1933, volume 16, January, p. 63.)

F. Herbert Haessler.

Charlin, Carlos. **Nasal neuritis from general causes.** Boletin de Informacion Oft., 1932, 5th yr., March-April, pp. 89-96. (See Amer. Jour. Ophth., 1932, v. 15, Sept., p. 892.)

NEWS ITEMS

News items in this issue were received from Dr. Paul G. Moore, Cleveland, Ohio. News items should reach **Dr. Melville Black, 424 Metropolitan Building, Denver,** by the twelfth of the month.

Deaths

Dr. John Gerald Murphy, Wilmington, N.C.; aged sixty years; died December 18, 1932, of pneumonia.

Miscellaneous

We wish to repeat a notice published in the News Items in this Journal in December:

The International Travel Bureau, Inc., has requested that we advise ophthalmologists that they would be glad to arrange accommodations for any ophthalmologists desiring to attend the International Congress of Ophthalmologists at Madrid, April 16 to 25, 1933. A special rate can be obtained if twenty-five or more apply as a group to this agency. If interested in this, address your communication direct to The International Travel Bureau, Inc., 604 Fifth Ave., New York City.

The Fourth Congress of the Pan-American Medical Association will be held in Dallas, Texas, March 21-25, under the presidency of Dr. John O. McReynolds.

The December issue of the Journal of the Indiana State Medical Association observes the twenty-fifth year of its establishment with a special anniversary number. Nine pages are devoted to memorial tributes from medical and other friends of the late Dr. Albert Eugene Bulson, editor of the journal from its inception until his death last July. In this issue, for the first time in the journal's history, a picture of Dr. Bulson appears in its pages. The journal also contains an article by Dr. Bulson on "Eye Fundus Lesions in Nephritis".

New York University in cooperation with the New York State Department of Social Welfare offers a four months' course in "A Survey of Eye Conditions" beginning February 7, 1933.

The Gill Memorial Eye, Ear and Throat Hospital of Roanoke, Virginia, will hold its Seventh Annual Spring Graduate course from April 3rd to 8th. For more detailed information see their advertisement on advertising page III.

Societies

The annual meeting of the Pacific Coast Oto-Ophthalmological Society will take place in San Francisco on June 28, 29, and 30, 1933. The officers of the Society are: President: Hans Barkan, M.D., 490 Post Street, San Francisco; Secretary-Treasurer: Frederick C. Cordes, M.D., 384 Post Street, San Francisco; First Vice-President: Bertram C. Davies, M.D., 924 Pacific Mutual Bldg., Los Angeles; Second Vice-President: Lee B. Bouvy, M.D., La Grande, Oregon.

The annual meeting of the Ophthalmological Society of Egypt will take place at the Memorial Ophthalmic Laboratory, Giza, March 10, 1933.

Personals

Dr. Robert J. Masters, Indianapolis, was elected president of the Indiana Academy of Ophthalmology, December 14th, and Dr. John K. Leasure, of that city, was reelected secretary.

The December issue of the Zeitschrift für Augenheilkunde, comprising two hundred and thirty-four pages of reading matter with several plates, was issued as a special number in honor of the seventieth birthday of Professor Maximilian Salzmann of Graz, Austria.

Dr. Harvey J. Howard has opened a private office in the Park Plaza Hotel, Kingshighway and Maryland avenue, St. Louis. He addressed the Los Angeles Society of Ophthalmology and Otolaryngology, November 28, 1932, on "The diagnosis and etiology of trachoma in the light of recent work".

The Cleveland Ophthalmological Club held its fifteenth regular meeting on December 6, 1932. Dr. Wm. Thornwall Davis of Washington, D.C., read a paper on "The phorias as the cause of obstinate asthenopia; Their cure by surgical and other means." The presentation was extremely interesting and was thoroughly discussed by several members of the club.